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NASA SP-449



# A Catalog of NASA Special Publications

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# A Catalog of NASA Special Publications

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UNANNOUNCED

## Introduction

THIS booklet attempts to list all Special Publications that have been released by NASA since the series was begun in 1961. It is an effort to still cries from those who have asked for a comprehensive listing. The Special Publication series, which has included some of NASA's most ambitious scientific or technical books, has covered a broad range of topics, including much of the agency's research and development work, its full range of space-exploration programs, its work in advancing aeronautics technology, and many associated historical and managerial efforts. In the nearly two decades that the series has existed, some 1200 titles have borne the SP identifier.

How NASA Special Publications came about may be instructive. Along with several predecessor agencies, NASA research laboratories were accustomed to publishing reports, using a formal structure of four or five separate series, with the characteristics of each series carefully defined. Inevitably this raised the question, how do you categorize reports that don't fit existing patterns? The answer, obviously, is that you put them in another series labeled "special." The backroom gnomes who invented this solution had no knowledge that they were inventing a bushy tail that would soon wag the dog. By the mid-1960s the new series was becoming preeminent among NASA publications, and beginning to win worldwide recognition.

The reason of course is that these were exciting years. It was the time of Mercury, Gemini, and the foundation work for Apollo in manned spaceflight; of Ranger, Mariner, and Surveyor in unmanned probes; of dozens of scientific and applications satellites. It was a time when weather satellites first gave early hurricane warnings, and when relay stations in the sky made intercontinental television an everyday affair. It was a time when spacecraft began to capture and return exciting images from space, of steadily improving resolution and quality, providing insights long denied to terrestrial eyes. The editors producing NASA SPs worked long and hard at obtaining the best reproduction quality that could be managed with the constraints imposed by time and available funds, and the quirks of Government printing regulations.

So the series flourished and grew beyond precedent and dreams. Subsets appeared within the numbering scheme, with special blocks of numbers for handbooks, for histories, for technology-utilization books, for bibliographies, and for spacecraft design criteria. The SP General series bloomed with mission reports, scientific results, aerodynamic treatises, atmospheric models, structural analyses, and planetary atlases. By the mid-1970s it was evident that increasing selectivity and the invention of subsets were not effective in checking the overbalancing growth of the series, and a reorganization took place. Analysis showed that more and more proceedings of conferences were being published, for nowadays research and exploration are almost invariably collective activities, and the practitioners are intensely interactive people. So these publications were split off and given a series of their own, Conference Publications. Handbooks, data compilations, and computer printouts became Reference Publications. Administrative and ephemeral studies were relegated to other crevices of the publishing system. But so wide-ranging are NASA's goals and missions, that the flow of forthcoming SPs remains scarcely abated.

As this booklet goes to press, there are about 450 titles in the General SP series alone. Many have been very popular, often publicized by word of mouth; but promotion and distribution have perhaps never been adequate, and so visibility is somewhat limited. NASA's policy has been to recognize that it can provide copies only to its "extended family"—itself, its contractors and grantees, and the various academic, scientific, and industrial communities involved in space exploration and aeronautics. The general public has been expected to turn to the Government Printing Office or to the National Technical Information Service for publications. Both organizations have recently been displaying talent in book merchandising, but for most of the life of the SP series it has been sadly true that a

would-be buyer had to want a book pretty badly to get it. Nevertheless, several dozen Special Publications have become best sellers, including EXPLORING SPACE WITH A CAMERA, THIS ISLAND EARTH, APOLLO EXPEDITIONS TO THE MOON, MISSION TO EARTH, and THE MARTIAN LANDSCAPE. The popularity of the richly illustrated books came as no surprise to the backroom editors who produce SPs, but who would have foreseen the success of such unassuming titles as CLARITY IN TECHNICAL REPORTING, or SOLDERING ELECTRICAL CONNECTIONS?

Special Publications produced in the last twenty years cover a range of subjects. Many of NASA's glorious moments are found in this series. Some of the SPs are scientific and are distributed mainly within a discipline; others present a popular discussion of NASA's programs and are heavily illustrated with color imagery from space.

Those Special Publications thought to have a wide interest or which were disciplinary classics were printed at GPO, and those published within the last few years or which have been good sellers are still available from GPO.

Copies of all books listed as available from NTIS as well as books allowed to go out of print at GPO are available from NTIS. A note of caution: if you order a book from GPO and a reply indicates that it is out of print, you should reconsider your order. If you have ordered a book primarily for the photography or imagery, a subsequent order from NTIS will not be satisfactory. If, however, your interest is in the text, the black and white photocopy supplied from NTIS will be suitable. NTIS is the sales source for public documents produced by the government agencies. A few printed copies are available initially, but once that supply is depleted, NTIS supplies photocopies.

In the list of publications that follows, a brief description is given together with the original sales source and the publication date. The prices are not listed because they change. Phone or write GPO or NTIS for prices of publications that interest you. GPO will want to know the NASA SP number; NTIS will want to know the seven-digit NASA accession number.

As you browse through this list, and you find an attractive title, take care to notice the date of publication. Many books are out of date, and are of historical value only. For example, some books on Mars predate the 1976 Viking mission.

This capsule account of the growth of NASA SPs is necessarily abbreviated, and omits many tales of the lurches, false starts, and dead ends that accompany many human enterprises. It does suggest, though, that as long as bright people devote their lives to exciting research and exploration, energetic and devoted backroom editors will remain to try to capture their results, and a little of their spirit, on paper.—Kay E. Voglewede.

Addresses for ordering publications

GPO:

Superintendent of Documents  
U.S. Government Printing Office  
Washington, DC 20402

(202) 783-3238 or (202) 783-3311 Price information; orders

NTIS:

National Technical Information Service  
5285 Port Royal Rd.  
Springfield, VA 22161

(703) 487-4780 Information or document accession number

(703) 487-4650 Sales Desk; price information

(703) 487-4630 Subscription information for bibliographies (SP-7000 series)

COSMIC:

Computer Software Management and Information Center  
Barrows Hall  
University of Georgia  
Athens, GA 30601

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## General

### **NASA-Industry Program Plans Conference, July 28-29, 1960**

*I. H. Abbott, M. B. Ames,  
H. L. Dryden, et al.*

N63-90346 126 pp  
Avail NTIS 1960

### **Proceedings of a Conference on Results of the First U.S. Manned Suborbital Space Flight**

*H. L. Dryden*

N64-80458 76 pp  
Avail GPO 1961

### **Proceedings of First National Conference on the Peaceful Uses of Space**

N64-81182 179 pp  
Avail NTIS 1961

### **Results of the Second U.S. Manned Suborbital Space Flight, July 21, 1961**

N64-84681 58 pp  
Avail GPO 1961

### **Proceedings of the International Meteorological Satellite Workshop, November 13-22, 1961**

NASA meteorological satellite program, Tiros satellites, cloud studies, NASA meteorological satellite plans for the future.

N62-11221 233 pp  
Avail GPO 1962

### **NASA Project Names**

A listing of names and code words associated with NASA programs.

N62-11673 20 pp  
Avail NTIS 1962

### **Results of the First United States Manned Orbital Space Flight, February 20, 1962**

N62-10229 204 pp  
Avail GPO 1962

### **U.S. Standard Atmosphere, 1962**

Tables of atmospheric properties, systematic variations in the atmosphere, gravity, geopotential.

N63-13176 5 pp  
Avail NTIS 1963

### **The United States in Space**

Activities in the United States space program.

N64-12818 227 pp  
Avail NTIS 1963

### **Proceedings of the Experimenters' Information Meeting on the Apollo Applications Program in Bioscience**

*D. R. Beem, S. J. Gerathewohl*

N66-31806 137 pp  
Avail NTIS 1966

### **U.S. Standard Atmosphere Supplements, 1966**

Tables and models depicting conditions other than mid-latitude mean.

N67-37900 304 pp  
Avail NTIS 1966

### **Short Glossary of Space Terms**

Glossary of technical terms in frequent use by aerospace technologists.

NASA SP-1  
N66-25785 55 pp  
Avail NTIS 1962

### **Proceedings of the Second Image Intensifier Symposium**

Advances in science, technology, and application of image tubes. Symposium, October 1961.

NASA SP-2  
N62-14873 252 pp  
Avail NTIS 1961

### **List of Selected References on NASA Programs**

Technical reports, technical notes, technical translations, journal articles, speeches, Congressional documents.

NASA SP-3  
N62-14103 263 pp  
Avail NTIS 1962

### **NASA Day, April 27, 1962: Western Space Age Industries and Engineering Exposition and Conference**

Space science, applications, tracking and data acquisition.

NASA SP-4  
N62-14863 66 pp  
Avail NTIS 1962

### **Space Scientists and Engineers: Selected Biographical and Bibliographical Listing, 1957-1961**

NASA SP-5  
N63-90035 336 pp  
Avail NTIS 1962

**Results of the Second United States  
Manned Orbital Space Flight, May 24,  
1962**

Spacecraft and launch systems, modified Mercury network, space phenomena, medical aspects.

NASA SP-6  
N62-14691 107 pp  
Avail NTIS 1962

**Dictionary of Technical Terms for  
Aerospace Use**

*W. H. Allen*

NASA SP-7  
N66-10413 310 pp  
Avail NTIS 1965

**Proceedings of the Second National  
Conference on the Peaceful Uses of  
Space**

Mercury, Apollo, Gemini projects; meteorological and communication satellites. Conference, May 1962.

NASA SP-8  
N63-11137 272 pp  
Avail GPO 1962

**Index of NASA Technical Publications  
With Abstracts**

July 1960 to December 1961.

NASA SP-9  
N63-90006 432 pp  
Avail NTIS 1961

**Launch Vehicles of the National  
Launch Vehicle Program**

*J. E. Webb*

Technical descriptions of Scout, Delta, Titan, Atlas, Thor-Agena, Centaur, Saturn, advanced Saturn, and Nova launch vehicles.

NASA SP-10  
N63-10712 34 pp  
Avail NTIS 1962

**Proceedings of the NASA-University  
Conference on the Science and Technology of Space Exploration**

*H. R. Anderson, W. R. Bandeen,  
G. W. Beadle, et al.*

Rockets, geophysics, astronomy, celestial mechanics, bioastronautics. Conference, November 1962.

NASA SP-11  
N63-11501 412 pp  
Avail GPO 1962

**Results of the Third U.S. Manned Orbital  
Space Flight, October 3, 1962**

Spacecraft and launch vehicle performance, aeromedical analysis, pilot's flight report.

NASA SP-12  
N63-11990 122 pp  
Avail GPO 1962

**Geophysics and Astronomy in Space  
Exploration**

*R. E. Bourdeau, J. K. Kupperian, Jr.,  
G. H. Ludwig, et al.*

Sounding rockets, space flight ionosphere studies, particles and fields research in space, astronomical research in space, astronomy research.

NASA SP-13  
N63-11503 45 pp  
Avail NTIS 1962

**Lunar and Planetary Sciences in Space  
Exploration**

*H. R. Anderson, J. E. Conel,  
M. Eimer, et al.*

Radar astronomy, exploration of deep space, interplanetary space physics, astrophysics, geological exploration of the Moon and planets.

NASA SP-14  
N63-11504 84 pp  
Avail NTIS 1962

**Celestial Mechanics and Space Flight  
Analysis**

*C. R. Gates, T. W. Hamilton,  
W. M. Kaula, et al.*

Computer techniques, satellite orbits, spacecraft flight, space flight optimization.

NASA SP-15  
N63-11505 42 pp  
Avail NTIS 1962

**Data Acquisition From Spacecraft**

*W. R. Bandeen, A. G. Ferris,  
C. C. Kirsten, et al.*

Role of data processing in orbit determination, scientific and meteorological satellites, data acquisition at planetary ranges.

NASA SP-16  
N63-11506 58 pp  
Avail NTIS 1962

**Control, Guidance, and Navigation of  
Spacecraft**

*J. C. Bird, B. F. Doolin,  
J. V. Foster, et al.*

Space rendezvous, atmosphere entry, space vehicle attitude control.

NASA SP-17  
N63-11507 56 pp  
Avail NTIS 1962



### Bioastronautics

*S. J. Gerathewohl, B. E. Gernandt,  
R. S. Johnston, et al.*

Bioengineering, exobiology, environmental biology, physiological and behavioral sciences.

NASA SP-18  
N63-11508 36 pp  
Avail NTIS 1962

### Chemical Rocket Propulsion

*C. L. Ball, M. J. Hartmann,  
E. R. Jonasb, et al.*

Physics of liquid propellants, pumps, turbines, chemical rockets, research on rocket combustion and thrust chambers.

NASA SP-19  
N63-11509 55 pp  
Avail NTIS 1962

### Nuclear Rocket Propulsion

*D. Bogart, H. H. Ellerbrock,  
D. S. Gabriel, et al.*

Fluid flow, heat transfer, reactors, dynamics and control of nuclear rockets.

NASA SP-20  
N63-11510 62 pp  
Avail NTIS 1962

### Power for Spacecraft

*C. A. Barrett, D. T. Bernatowicz,  
T. P. Moffitt, et al.*

Interrelation of power requirements, energy sources, conversion techniques.

NASA SP-21  
N63-11511 27 pp  
Avail NTIS 1962

### Electric Propulsion for Spacecraft

*E. E. Callaghan, J. R. Jack,  
S. Lieblein, et al.*

Power generation systems, electrothermal thrusters.

NASA SP-22  
N63-11512 37 pp  
Avail NTIS 1962

### Aerodynamics of Space Vehicles

*M. H. Bertram, R. W. Boswinkle, Jr.,  
J. P. Campbell, et al.*

Launch vehicles, space vehicle landing, hypersonic cruising, advanced reentry vehicles.

NASA SP-23  
N63-11513 57 pp  
Avail NTIS 1962

### Gas Dynamics in Space Exploration

*H. J. Allen, T. N. Canning,  
G. Goodwin, et al.*

Hypersonic flow fields, gases at hypervelocities.

NASA SP-24  
N63-11514 52 pp  
Avail NTIS 1962

### Plasma Physics and Magnetohydrodynamics in Space Exploration

*A. Busemann, M. C. Ellis, Jr.,  
R. V. Hess, et al.*

Drag forces in the Earth's upper atmosphere, plasma frequency and radio attenuation, plasma accelerator research.

NASA SP-25  
N63-11515 78 pp  
Avail NTIS 1962

### Laboratory Techniques in Space Environment Research

*D. D. Elleman, F. B. Humphrey,  
H. E. Martens, et al.*

High-vacuum research techniques, modern magnetism, magnetic field generation.

NASA SP-26  
N63-11516 52 pp  
Avail NTIS 1962

### Materials for Space Operations

*D. D. Davis, Jr., R. H. Kemp,  
G. F. Pezdirtz, et al.*

Nonmetallic materials for spacecraft, ablation materials for atmospheric entry, flow and fracture problems, high-strength materials research.

NASA SP-27  
N63-11517 47 pp  
Avail NTIS 1962

### Structures for Space Operations

*R. A. Anderson, G. W. Brooks,  
R. W. Leonard, et al.*

Winged vehicle and planetary entry vehicle configuration and design.

NASA SP-28  
N63-11518 48 pp  
Avail NTIS 1962

**Proceedings of the Second NASA-  
Industry Program Plans Conference**

*W. L. Lingle, Jr.,*

NASA missions, future trends, space sciences program, lunar and planetary programs, biological problems related to space, launch vehicles and propulsion, meteorological and communication systems. Conference, February 1963.

NASA SP-29  
N63-15357 221 pp  
Avail GPO 1963

**The Observatory Generation of  
Satellites**

Orbiting solar, geophysical, and astronomical observations. Symposium, December 1962.

NASA SP-30  
N63-15166 62 pp  
Avail GPO 1963

**Measurement of Thermal Radiation  
Properties of Solids**

*J. C. Richmond*

Measurement of thermal radiation properties of solids over a wide range of temperatures; emittance studies. Symposium, September 1962.

NASA SP-31  
N64-10937 596 pp  
Avail GPO 1963

**Telstar I**

Volume 1. Design, construction, ground facilities uses.

NASA SP-32  
N64-10868 400 pp  
Avail NTIS 1963

Volume 2. Antennas, results of Telstar tests and experiments.

NASA SP-32  
N64-10882 525 pp  
Avail NTIS 1963

Volume 3. Components and systems.

NASA SP-32  
N64-11079 283 pp  
Avail NTIS 1963

Volume 4. Operations, characteristics, performance.

NASA SP-32  
N67-12301 448 pp  
Avail NTIS 1965

**Space Flight Handbooks. Volume 1:  
Orbital Flight Handbook**

*D. Kraft, G. Townsend*

Part 1. Basic Techniques and Data

NASA SP-33  
N63-21101 523 pp  
Avail NTIS 1963

**Space Flight Handbooks. Volume I:  
Orbital Flight Handbook (cont.)**

Part 2. Mission Sequencing Problems

NASA SP-33  
N63-21102 443 pp  
Avail NTIS 1963

Part 3. Requirements

NASA SP-33  
N63-21103 384 pp  
Avail NTIS 1963

**Space Flight Handbooks. Volume II:  
Lunar Flight Handbook**

*F. Martikan, F. Santora*

Part 1. Background Material

NASA SP-34  
N63-21104 143 pp  
Avail NTIS 1963

Part 2. Lunar Mission Phases

NASA SP-34  
N63-21105 444 pp  
Avail NTIS 1963

Part 3. Mission Planning

NASA SP-34  
N63-21106 156 pp  
Avail NTIS 1963

**Space Flight Handbooks. Volume III:  
Planetary Flight Handbook**

*S. Ross*

Part 1. Speed Contours and Auxiliary Graphs for Manned Missions to Mars and Venus

NASA SP-35  
N64-14175 280 pp  
Avail NTIS 1963

Part 2. Supplementary Trajectory Data: Earth to Venus and Earth to Mars

NASA SP-35  
N64-14176 522 pp  
Avail NTIS 1963

Part 3. Supplementary Trajectory Data: Venus to Earth and Mars to Earth

NASA SP-35  
N64-14177 530 pp  
Avail NTIS 1963

Part 5. Trajectories to Jupiter, Ceres, and Vesta

NASA SP-35  
N66-21045 541 pp  
Avail NTIS 1966

Part 6. Mars Stopover Missions Using Venus Swingbys

NASA SP-35  
N68-30098 98 pp  
Avail NTIS 1968

Part 7. Direct Trajectories to Jupiter, Saturn, Uranus, and Neptune

NASA SP-35  
N69-33490 105 pp  
Avail GPO 1969

**Space Flight Handbooks. Volume III:  
Planetary Flight Handbook (cont.)**

Part 8. Jupiter Swingby Missions to Saturn,  
Uranus, Neptune, and Pluto

NASA SP-35  
N69-34850 131 pp  
Avail GPO 1969

Part 9. Direct and Venus Swingby Trajec-  
tories

NASA SP-35  
N70-28534 238 pp  
Avail GPO 1970

**Aerodynamic Design of Axial-Flow  
Compressors**

*R. O. Bullock, I. A. Johnsen*

Aerodynamic systems design of axial flow  
compressors.

NASA SP-36  
N65-23345 524 pp  
Avail NTIS 1965

**Conference on Space, Science, and  
Urban Life**

*W. E. Thompson*

Use of space age science and technology to  
solve socioeconomic problems of metropol-  
itan areas resulting from industrial growth.  
Conference, March 1963.

NASA SP-37  
N64-11502 265 pp  
Avail GPO 1963

**Advanced Bearing Technology**

*W. J. Anderson, E. E. Bisson*

Fundamentals of friction and wear on fluid  
film and rolling-element bearings.

NASA SP-38  
N64-15226 517 pp  
Avail GPO 1964

**Results of the Project Mercury Ballistic  
and Orbital Chimpanzee Flights**

*J. P. Henry, J. D. Moseley*

NASA SP-39  
N64-12915 77 pp  
Avail GPO 1963

**Proceedings of the Conference on  
Space-Age Planning**

Space-age planning and the peaceful uses of  
space. Conference, May 1963.

NASA SP-40  
N63-21126 272 pp  
Avail GPO 1963

**Proceedings of the NASA-AEC Liquid-  
Metals Corrosion Meeting, Volume 1**

Liquid metal corrosion processes.

NASA SP-41  
N64-20783 292 pp  
Avail NTIS 1964

**Proceedings of the NASA-AEC Liquid-  
Metals Corrosion Meeting, Volume 2**

NASA SP-42  
N73-70372 54 pp  
Avail NTIS 1963

**Ariel I: The First International Satellite**

*R. C. Baumann*

Development of Ariel I ionosphere satellite.

NASA SP-43  
N64-10332 84 pp  
Avail NTIS 1963

**Proceedings of the Conference on the  
Law of Space and of Satellite  
Communications**

Space law and communications satellites, free  
space lower boundary, control of space, or-  
bital regulation, and international coopera-  
tion. Conference, May 1963.

NASA SP-44  
N64-21136 212 pp  
Avail GPO 1964

**Mercury Project Summary, Including  
Results of the Fourth Manned Orbital  
Flight, May 15-16, 1963**

Space vehicle development, mission support,  
flight operations, mission results.

NASA SP-45  
N63-21951 435 pp  
Avail GPO 1963

**Physics of Nonthermal Radio Sources**

*A. G. W. Cameron, S. P. Maran*

Spectra, polarization, and optical properties  
of galactic and extragalactic light sources.  
Conference, December 1962.

NASA SP-46  
N65-13251 159 pp  
Avail NTIS 1964

**Space Cabin Atmospheres. Part I:  
Oxygen Toxicity**

*E. M. Roth*

High oxygen tension in animals and humans.  
oxygen toxicity, and drug therapy.

NASA SP-47  
N64-31219 59 pp  
Avail GPO 1964

### **Space Cabin Atmospheres. Part II: Fire and Blast Hazards**

*E. M. Roth*

Fire and blast hazards in space cabin atmospheres.

NASA SP-48  
N64-20744 126 pp  
Avail GPO 1964

### **Meteorological Observations Above 30 Kilometers**

Meteorological rocket soundings in stratosphere and mesosphere. Conference, July 1963.

NASA SP-49  
N64-23869 61 pp  
Avail GPO 1964

### **AAS-NASA Symposium on the Physics of Solar Flares**

*W. N. Hess*

Spectrographic and magnetic observations of flares, x-ray and gamma ray bursts, radio bursts, energetic particles, theory of flares. Symposium, October 1963.

NASA SP-50  
N64-30251 433 pp  
Avail GPO 1964

### **Proceedings of the Fourth National Conference on the Peaceful Uses of Space**

Exploration of space, discoveries from space exploration, uses of weather and communication satellites. Conference, April 1964.

NASA SP-51  
N64-30326 205 pp  
Avail GPO 1964

### **Proceedings of the NASA Conference on Communicating Through Plasmas of Atmospheric Entry and Rocket Exhaust**

Reentry communication problems, studies using simulated reentry plasma, flight experiments. Conference, January 1964.

NASA SP-52  
N71-70451 231 pp  
Avail NTIS 1964

### **A Quasi-Global Presentation of Tiros III Radiation Data**

*L. J. Allison, T. I. Gray, Jr.,  
G. Warnecke*

Tiros III worldwide radiation map, synoptic application of infrared data.

NASA SP-53  
N65-10301 16 pp  
Avail GPO 1964

### **Scientific Findings From Explorer VI**

*H. E. Newell*

Scientific data acquired by Explorer satellite measurements; astronomy and celestial mechanics, ionospheric physics, and energetic particles in Van Allen belt and magnetic fields.

NASA SP-54  
N65-21965 377 pp  
Avail NTIS 1965

### **Symposium on Thermal Radiation of Solids**

*S. Katzoff*

Fundamentals, surface effects, measurement techniques, space environment effects, and applications of thermal radiation of solids. Conference, March 1964.

NASA SP-55  
N65-26855 590 pp  
Avail NTIS 1965

### **Concepts for Detection of Extra- terrestrial Life**

*F. H. Quimby*

NASA SP-56  
N65-12268 52 pp  
Avail NTIS 1964

### **Orbiting Solar Observatory Satellite OSO-1: The Project Summary**

OSO-1 spacecraft dynamics, structural design and fabrication, control systems, data acquisition and command system, power supply, thermal control, experiments, and test program.

NASA SP-57  
N66-29482 308 pp  
Avail NTIS 1965

### **Effect of Ionizing Radiation on a Series of Saturated Polyesters**

*G. F. Dalelio, R. Haberli,  
G. F. Pezdirtz*

NASA SP-58  
N65-11059 68 pp  
Avail NTIS 1964

### **Mariner-Venus 1962: Final Project Report**

Project organization and management, space vehicle system, trajectory and orbit, tracking and data acquisition, scientific results.

NASA SP-59  
N66-14702 380 pp  
Avail NTIS 1965

**X-15 Research Results, With a Selected Bibliography**

*W. H. Stillwell*

X-15 aircraft development concept, flight research, aerodynamic characteristics of supersonic-hypersonic flight, hypersonic structure, flying laboratory, and bibliography.

NASA SP-60  
N65-20162 135 pp  
Avail NTIS 1965

**Ranger VII Photographs of the Moon.  
Part I: Camera "A" Series**

Lunar surface closeup pictures.

NASA SP-61  
N64-31723 226 pp  
Avail GPO 1964

**Ranger VII Photographs of the Moon.  
Part II: Camera "B" Series**

NASA SP-62  
N65-17866 226 pp  
Avail GPO 1965

**Ranger VII Photographs of the Moon.  
Part III: Camera "P" Series**

Lunar photographs taken by four partial-scan cameras aboard Ranger VII.

NASA SP-63  
N65-33848 235 pp  
Avail NTIS 1965

**Progress in Development of Methods in Bone Densitometry**

*D. W. Jenkins, W. F. Neumann,  
G. D. Whedon*

Determining thickness and mineral content in vertebra and other bones by x-ray and other densitometry, application of techniques to human studies. Conference, March 1965.

NASA SP-64  
N66-17666 199 pp  
Avail NTIS 1966

**Space Technology. Volume I:  
Spacecraft Systems**

*L. H. Abraham*

Spacecraft systems, aerodynamics, power plants, loads, propellant tank design.

NASA SP-65  
N65-24625 82 pp  
Avail NTIS 1965

**Space Technology. Volume II:  
Spacecraft Mechanical Engineering**

*J. L. Adams*

Spacecraft design and mechanical engineering.

NASA SP-66  
N65-24626 169 pp  
Avail NTIS 1965

**Space Technology. Volume IV:  
Spacecraft Guidance and Control**

*J. R. Scull*

Spacecraft control, navigation, and guidance.

NASA SP-68  
N67-16059 140 pp  
Avail NTIS 1966

**Space Technology. Volume V:  
Telecommunications**

*J. J. Stiffler*

Improved data handling and pulse modulation systems for space telecommunication.

NASA SP-69  
N67-16555 148 pp  
Avail NTIS 1966

**Proceedings of the Conference on Space  
Nutrition and Related Waste Problems**

*T. C. Helvey*

Conference, April 1964.

NASA SP-70  
N65-18566 408 pp  
Avail NTIS 1964

**Proceedings of Second Symposium on  
Protection Against Radiation in Space**

*A. Reetz, Jr.*

Symposium, October 1964.

NASA SP-71  
N65-34575 519 pp  
Avail NTIS 1965

**Symposium on the Analysis of Central  
Nervous System and Cardiovascular  
Data Using Computer Methods**

*W. R. Adey, L. D. Proctor*

Symposium, October 1964.

NASA SP-72  
N65-28750 492 pp  
Avail NTIS 1965

**The Nature and Scope of the NASA  
University Program**

*T. L. K. Smull*

NASA SP-73  
N65-28332 41 pp  
Avail NTIS 1965

**Survey of the Literature of the Solar  
Constant and the Spectral Distribution  
of Solar Radiant Flux**

*M. P. Thekaekara*

Solar constant, spectral distribution of solar radiant flux, solar radiation laws and simulation, spacecraft thermal balance, and radiation measurement scale.

NASA SP-74  
N65-22362 47 pp  
Avail NTIS 1965

**An Analysis of the Extraterrestrial Life Detection Problem**

*R. D. Johnson, R. B. Painter,  
R. S. Young*

NASA SP-75  
N65-34227 36 pp  
Avail NTIS 1965

**Final Report on the Relay I Program**

Relay I satellite program to carry out communications experiments with spacecraft, to detect radiation particles in Van Allen belt, and to determine radiation damage to components.

NASA SP-76  
N66-10226 749 pp  
Avail NTIS 1965

**First Conference on the Role of the Vestibular Organs in the Exploration of Space**

Role of vestibular apparatus, semicircular canals, and otolith organs in space explorations. Symposium, January 1965.

NASA SP-77  
N66-16106 376 pp  
Avail NTIS 1965

**The Meteoroid Environment and Its Effects on Materials and Equipment**

*W. A. Cosby, R. G. Lyle*

Hypervelocity impact phenomena.

NASA SP-78  
N66-14158 119 pp  
Avail NTIS 1965

**Electrical Power Generation Systems for Space Applications**

Current and predicted state of the art of solar, chemical, and nuclear systems.

NASA SP-79  
N65-25272 42 pp  
Avail NTIS 1965

**Short-Term Frequency Stability**

Panel discussion on frequency stability measurement techniques. Symposium, November 1964.

NASA SP-80  
N66-10381 296 pp  
Avail NTIS 1965

**Summary Report on the NASA University Program Review Conference**

*D. J. Montgomery*

Nature, conduct, results, and impact of the program. Conference, March 1965.

NASA SP-81  
N65-28249 42 pp  
Avail NTIS 1965

**Proceedings of the Fifth National Conference on the Peaceful Uses of Space**

Space research impact on national economy and industry, communications, education, and science and technology. Conference, May 1965.

NASA SP-82  
N66-30366 212 pp  
Avail NTIS 1966

**Conference on Aircraft Operating Problems**

Conference on aircraft operational problems of general, supersonic, V/STOL and STOL aircraft. May 1965.

NASA SP-83  
N65-31100 335 pp  
Avail NTIS 1965

**Bioenergetics of Space Suits for Lunar Exploration**

*E. M. Roth*

Literature review.

NASA SP-84  
N66-27235 145 pp  
Avail NTIS 1966

**NASA University Program Review Conference**

Training, research, space flight, technology, facilities, and experimentation. Conference, March 1965.

NASA SP-85  
N66-12401 375 pp  
Avail NTIS 1965

**Medical Aspects of an Orbiting Research Laboratory**

*S. P. Vinograd*

Life support system recommendations, human reaction to medical experiments for orbital research laboratory. Space Medicine Advisory Group Study, August 1964.

NASA SP-86  
N66-33199 152 pp  
Avail NTIS 1966

**Proceedings of the Apollo Unified S-Band Technical Conference**

Tracking and communications system for Apollo spacecraft at lunar distances using S-band. Conference, July 1965.

NASA SP-87  
N65-35476 277 pp  
Avail NTIS 1965

### **NASA 1965 Summer Conference on Lunar Exploration and Science**

Overall program for lunar exploration missions, role of various scientific disciplines in early Apollo missions, manned lunar orbiter and surface expeditions, post-Apollo programs. Conference, July 1965.

NASA SP-88  
N66-14826 448 pp  
Avail NTIS 1965

### **Observations From the Nimbus I Meteorological Satellite**

NASA SP-89  
N66-12130 92 pp  
Avail NTIS 1965

### **Progress of the X-15 Research Airplane Program**

Conference, October 1965.

NASA SP-90  
N73-71303 133 pp  
Avail NTIS 1965

### **Significant Achievements in Space Astronomy, 1958-1964**

Space astronomy developments in x-ray, gamma-ray, ultraviolet, infrared, and low-frequency radio spectra.

NASA SP-91  
N66-34786 71 pp  
Avail NTIS 1966

### **Significant Achievements in Space Bioscience, 1958-1964**

Research in exobiology, environmental biology, behavioral biology, molecular biology and bioinstrumentation, space flight programs, and manned space flight.

NASA SP-92  
N66-17778 142 pp  
Avail NTIS 1966

### **Significant Achievements in Space Communications and Navigation, 1958-1964**

Reasons for and advantages of communications and navigation satellites.

NASA SP-93  
N66-18458 73 pp  
Avail NTIS 1966

### **Significant Achievements in Satellite Geodesy, 1958-1964**

Satellite observations in geodetic surveying.

NASA SP-94  
N66-37346 178 pp  
Avail NTIS 1966

### **Significant Achievements in Ionospheres and Radio Physics, 1958-1964**

*E. R. Schmerling*

NASA SP-95  
N66-22936 68 pp  
Avail NTIS 1966

### **Significant Achievements in Satellite Meteorology, 1958-1964**

Meteorological satellite and sounding rocket configurations and instrumentation, cloud photography, radiometry, data acquisition and processing.

NASA SP-96  
N66-19523 148 pp  
Avail NTIS 1966

### **Significant Achievements in Particles and Fields, 1958-1964**

Explorer satellite and Mariner space probe data on solar wind, radiation belts, trapped particles, geomagnetic field, cosmic rays, and neutrons.

NASA SP-97  
N66-19524 99 pp  
Avail NTIS 1966

### **Significant Achievements in Planetary Atmospheres, 1958-1964**

Planetary and Earth atmospheric composition, temperature, and activity data from satellites and sounding rockets.

NASA SP-98  
N66-19525 65 pp  
Avail NTIS 1966

### **Significant Achievements in Planetology, 1958-1964**

Terrestrial observations of lunar and planetary electromagnetic radiation and chemical-mineralogical composition, and space probe data and instrumentation.

NASA SP-99  
N66-23475 81 pp  
Avail NTIS 1964

### **Significant Achievements in Solar Physics, 1958-1964**

Solar soft x-ray and ultraviolet mapping, hard x-ray emission, corona, satellite monitored radiation, and instrumentation study summaries for solar physics.

NASA SP-100  
N66-25003 106 pp  
Avail NTIS 1966

**Conference on Langley Research  
Related to Apollo Mission**

Heating and thermal protection, landing dynamics, spacecraft simulation. Conference, June 1965.

NASA SP-101  
N72-71553 413 pp  
Avail NTIS 1965

**Philosophy of Simulation in a Man-  
Machine Space Mission System**

*T. M. Fraser*

Nature of simulation; prerequisites for simulation; fidelity, realism, and transfer of training; use of manned simulators.

NASA SP-102  
N66-27236 116 pp  
Avail NTIS 1966

**Human Responses to Sustained  
Acceleration**

*T. M. Fraser*

Review and bibliography of human response to sustained acceleration.

NASA SP-103  
N66-27319 137 pp  
Avail NTIS 1966

**Proceedings of a Conference on  
Theoretical Biology**

*G. J. Jacobs*

Cell synthesis and ecology. Conference, November 1963.

NASA SP-104  
N66-30395 211 pp  
Avail NTIS 1966

**Vacuum Technology and Space  
Simulation**

*D. H. Holkeboer, D. W. Jones,  
F. Pagano, et al.*

Nomenclature, pressure, pressure gauges, pumping speed and systems, cryogenic pumping, gas load, outgassing of materials, leak detection, gas flow in components and systems, space simulation and vacuum systems.

NASA SP-105  
N66-36129 331 pp  
Avail GPO 1966

**The Dynamic Behavior of Liquids in  
Moving Containers**

*H. N. Abramson*

Dynamic behavior of liquids in moving containers with applications to propellants in space vehicle fuel tanks.

NASA SP-106  
N67-15884 479 pp  
Avail NTIS 1966

**Proceedings of a Symposium on Passive  
Gravity-Gradient Stabilization**

Passive gravity-gradient stabilization systems for satellites. Symposium, May 1965.

NASA SP-107  
N66-36326 291 pp  
Avail NTIS 1966

**Spacecraft Sterilization Technology**

Spacecraft sterilization requirements, microbiological contamination control, sterilization techniques. Conference, November 1965.

NASA SP-108  
N67-14761 601 pp  
Avail NTIS 1966

**Development of Small Animal Payload  
and Integration with a Sounding  
Rocket**

*L. J. Early*

NASA SP-109  
N66-33540 110 pp  
Avail NTIS 1966

**Involuntary Hypohydration in Man and  
Animals: A Review**

*J. E. Greenleaf*

NASA SP-110  
N66-23622 38 pp  
Avail NTIS 1966

**Ranger VIII Photographs of the Moon:  
Cameras "A," "B," and "P"**

Lunar photographs taken by Ranger VIII and photographic data tables.

NASA SP-111  
N66-25366 478 pp  
Avail GPO 1966

**Ranger IX Photographs of the Moon:  
Cameras "A," "B," and "P"**

Ranger IX photographs of crater Alphonsus on lunar surface.

NASA SP-112  
N66-26555 193 pp  
Avail NTIS 1966

**Dynamic Stability of Rotor-Bearing  
Systems**

*E. J. Gunter, Jr.*

NASA SP-113  
N67-11942 234 pp  
Avail NTIS 1966



### **Space Technology. Volume VI: Space Sciences**

*T. A. Farley*

Geomagnetism, solar and galactic cosmic rays, comets, influence on Earth environment.

NASA SP-114  
N67-18141 90 pp  
Avail NTIS 1966

### **Second Symposium on the Role of the Vestibular Organs in Space Exploration**

Vestibular changes, human equilibrium and orientation, adaptation of gravito-inertial receptor mechanisms during space missions. Symposium, January 1966.

NASA SP-115  
N67-15121 315 pp  
Avail NTIS 1966

### **Conference on V/STOL and STOL Aircraft**

Aerodynamic and performance characteristics, handling qualities, and propulsion systems for STOL, VTOL, and V/STOL aircraft. Conference, April 1966.

NASA SP-116  
N66-24606 461 pp  
Avail NTIS 1966

### **Space Cabin Atmospheres. Part III: Physiological Factors of Inert Gases**

*E. M. Roth*

NASA SP-117  
N67-22878 135 pp  
Avail NTIS 1967

### **Space Cabin Atmospheres. Part IV: One- Versus Multiple-Gas Systems**

*E. M. Roth*

Physiological factors, hardware, and environmental control tradeoffs for one and two gas systems of space cabin atmospheres.

NASA SP-118  
N67-29998 138 pp  
Avail NTIS 1967

### **Ariel I: The First International Satellite. Experimental Results**

Structural design, experimental data, tracking.

NASA SP-119  
N67-16514 163 pp  
Avail NTIS 1966

### **Fuel Cells**

*L. G. Austin*

Review of government-sponsored fuel cell research, 1950-1964.

NASA SP-120  
N67-40137 451 pp  
Avail NTIS 1967

### **Gemini Midprogram Conference**

Spacecraft and launch vehicle development and performance, flight operations, mission results, physical science and biomedical experiments. Conference, February 1966.

NASA SP-121  
N66-29626 417 pp  
Avail NTIS 1966

### **Summary Report on the NASA-Western University Conference**

*D. E. Cunningham*

Conference, November 1965.

NASA SP-122  
N67-11943 55 pp  
Avail NTIS 1966

### **Nuclear Rocket Technology Conference**

Graphite nuclear rocket and tungsten water-moderated nuclear rocket. Conference, April 1966.

NASA SP-123  
N73-70969 325 pp  
Avail NTIS 1966

### **Conference on Aircraft Aerodynamics**

Experimental techniques; stability and control; propulsion aerodynamics; subsonic, supersonic, and transonic aerodynamics. Conference, May 1966.

NASA SP-124  
N75-71754 611 pp  
Avail NTIS 1966

### **Design of Liquid Propellant Rocket Engines**

*D. H. Huang, D. K. Huzel*

Parameters for design of rocket engines and systems.

NASA SP-125  
N71-29405 461 pp  
Avail NTIS 1971

### **Surveyor I: A Preliminary Report**

Surveyor I preliminary data on lunar surface mechanical, thermal, and electrical properties, topography, and geology.

NASA SP-126  
N66-29481 50 pp  
Avail NTIS 1966

### **Astronomy in Space**

*G. E. Mueller, H. E. Newell,*

*N. G. Roman, et al.*

NASA space science astronomy program: orbiting satellite experiments for solar, stellar, and galactic observations.

NASA SP-127  
N67-18730 67 pp  
Avail NTIS 1967

**Second Annual NASA-University  
Conference on Manual Control**

Discrete and continuous models, multi-variable and adaptive control, information theory, design methods. Conference, March 1966.

NASA SP-128  
N67-15850 422 pp  
Avail NTIS 1966

**Earth Photographs From Gemini III,  
IV, and V**

Earth color photographs from Gemini III, IV, and V indicating terrain features and cloud systems.

NASA SP-129  
N67-26641 262 pp  
Avail GPO 1967

**A Review of the Mariner IV Results**

*O. W. Nicks*

Data on Mars, solar system, and interplanetary space flight.

NASA SP-130  
N67-31356 42 pp  
Avail NTIS 1967

**Space Power Systems Advanced  
Technology Conference**

Chemical and nuclear power, reactor heat sources, and power conversion. Conference, August 1966.

NASA SP-131  
N67-10261 295 pp  
Avail NTIS 1966

**Aerospace Measurement Techniques**

*G. G. Mannella*

Advanced aerospace technology measurement techniques and instrumentation. Symposium, July 1966.

NASA SP-132  
N67-17781 280 pp  
Avail NTIS 1967

**Scientific Satellites**

Equipment, instrumentation, communications, design, launch vehicles, and guidance of scientific satellites.

NASA SP-133  
N68-14965 828 pp  
Avail GPO 1967

**Conference on the Closed Life Support  
System**

Water purification, waste disposal, and food synthesis for space flights. Conference, April 1966.

NASA SP-134  
N67-34583 231 pp  
Avail NTIS 1967

**Meteor Orbits and Dust: Proceedings of  
a Symposium**

*G. S. Hawkins*

Concentrations and orbital calculations of meteors and meteoritic and extraterrestrial dust particles. Symposium, August 1965.

NASA SP-135  
N67-32038 437 pp  
Avail NTIS 1967

**Significant Achievements in Space  
Science, 1965**

*H. E. Newell*

NASA SP-136  
N67-19022 222 pp  
Avail NTIS 1967

**Significant Achievements in Space  
Applications, 1965**

Space satellite application in communications, navigation, geodesy, and meteorology.

NASA SP-137  
N67-18724 91 pp  
Avail NTIS 1966

**Gemini Summary Conference**

Rendezvous, docking, extravehicular activity, experiment results. Conference, February 1967.

NASA SP-138  
N68-14941 335 pp  
Avail NTIS 1967

**Mariner-Mars 1964: Final Project  
Report**

Mariner-Mars 1964 mission accomplishments.

NASA SP-139  
N68-18743 356 pp  
Avail NTIS 1967

**Interstellar Grains**

*J. M. Greenberg, T. P. Roark*

Observational and theoretical interpretations of interstellar grains. Conference, August 1965.

NASA SP-140  
N68-11456 275 pp  
Avail GPO 1967

**First Compilation of Papers on Trajec-  
tory Analysis and Guidance Theory**

Mathematical models to approximate functions, bounds and power series for three-body problems, satellite orbit theories, and other aspects of trajectory analysis and guidance theory.

NASA SP-141  
N67-29370 227 pp  
Avail NTIS 1967

### **A Survey of Space Applications**

NASA program for application of space science and technology to public sector.

NASA SP-142  
N67-23338 140 pp  
Avail GPO 1967

### **Oxide Dispersion Strengthened Alloys**

*N. J. Grant, R. W. Hall, H. J. Siegel*

State-of-the-art survey on oxide dispersion strengthened alloys for use as high temperature materials.

NASA SP-143  
N67-37477 30 pp  
Avail NTIS 1967

### **Third Annual NASA-University Conference on Manual Control**

Display devices, function models, decision processes, physiological modeling, computer processing of manual control records. Conference, March 1967.

NASA SP-144  
N68-15901 435 pp  
Avail NTIS 1967

### **A Survey of Attitude Sensors for Spacecraft**

*N. M. Hatcher*

Spacecraft attitude sensors design and operational features, horizon scanners, solar sensors, star trackers, space sextants, and map matchers.

NASA SP-145  
N67-31296 21 pp  
Avail NTIS 1967

### **Surveyor III: A Preliminary Report**

Preliminary observations from Surveyor III soft Moon landing, telemetered pictures and data on mechanical soil sampler, lunar surface properties.

NASA SP-146  
N67-32582 170 pp  
Avail NTIS 1967

### **Sonic Boom Research**

*A. R. Seebass*

Conference, April 1967.

NASA SP-147  
N68-21413 115 pp  
Avail NTIS 1967

### **Conference on Hypersonic Aircraft Technology**

Mission studies, configuration aerodynamics, hypersonic viscous flow, propulsion, structures and materials. Conference, May 1967.

NASA SP-148  
N74-73049 591 pp  
Avail NTIS 1967

### **Summary of Gemini Extravehicular Activity**

*R. M. Macbell*

NASA SP-149  
N68-15891 336 pp  
Avail NTIS 1967

### **The Zodiacal Light and the Interplanetary Medium**

*J. L. Weinberg*

Photometric and meteor observations, scattering properties, particle collection and impact, solar wind, and origin and evolution of zodiacal light in interplanetary medium. Conference, February 1967.

NASA SP-150  
N68-27475 395 pp  
Avail NTIS 1967

### **Relay Program Final Report**

Summary of operation, communications, and other experiments of Relay II satellite.

NASA SP-151  
N69-21065 368 pp  
Avail GPO 1968

### **Third Symposium on the Role of the Vestibular Organs in Space Exploration**

Symposium, January 1967.

NASA SP-152  
N68-29128 437 pp  
Avail NTIS 1968

### **Symposium on Computer Simulation of Plasma and Many-Body Problems**

Plasma physics, Vlasov theory, astrophysics, magnetohydrodynamics, many-body problems, and computer simulation. Symposium, April 1967.

NASA SP-153  
N67-37737 465 pp  
Avail NTIS 1967

### **Aerospace Electronic Systems Technology: A Briefing for Industry**

Conference, May 1967.

NASA SP-154  
N68-33169 319 pp  
Avail NTIS 1967

### **Significant Achievements in Space Science, 1966**

Advances in astronomy, exobiology, ionospheric sciences, radio and solar physics, planetary atmospheres, and planetology.

NASA SP-155  
N68-15748 224 pp  
Avail GPO 1967

### Significant Achievements in Space Applications, 1966

*R. H. McQuain*

Achievements of application technology satellites, communication satellites, navigation and traffic control satellite program, weather satellites, and satellite geodesy.

NASA SP-156  
N68-16015 97 pp  
Avail NTIS 1967

### 1967 Summer Study of Lunar Science and Exploration

*W. N. Hess*

Future of lunar manned and unmanned exploration and Apollo applications program.

NASA SP-157  
N67-40564 405 pp  
Avail NTIS 1967

### The Potential Applications of Satellite Geodetic Techniques to Geosciences

Potential applications of geodetic satellites to geology, oceanography, glaciology, and atmospheric physics.

NASA SP-158  
N68-18902 26 pp  
Avail NTIS 1968

### Recent Advances in Display Media

Properties and imaging techniques of various display devices: computer-directed visual flight control boards, integrated optical man-machine systems, and electro-optical methods. Symposium, September 1967.

NASA SP-159  
N68-22302 129 pp  
Avail NTIS 1963

### Vibration of Plates

*A. W. Leissa*

Tabulated numerical results of theories of plate vibration.

NASA SP-160  
N70-18461 360 pp  
Avail GPO 1969

### Biology of Hard Tissue: Proceedings of the Second Conference

*A. M. Budy*

Bone diseases and regeneration, cellular differentiation, and homeostasis of calcium. Conference, March 1966.

NASA SP-161  
N69-10444 399 pp  
Avail GPO 1968

### Objectives and Goals in Space Science and Applications, 1968

*J. E. Naugle*

Objectives, current programs, and future mission options in space sciences and applications.

NASA SP-162  
N69-13844 97 pp  
Avail GPO 1968

### Surveyor V: A Preliminary Report

Configuration, television picture transmission, and experiments on measuring chemical elements in lunar surface.

NASA SP-163  
N68-17844 162 pp  
Avail NTIS 1967

### Thermal Radiation Heat Transfer

*J. R. Howell, R. Siegel*

Volume I. The Blackbody, Electromagnetic Theory, and Material Properties

NASA SP-164  
N68-28530 194 pp  
Avail NTIS 1968

Volume II. Radiation Exchange Between Surfaces and in Enclosures

NASA SP-164  
N69-30317 290 pp  
Avail GPO 1969

Volume III. Radiation Transfer With Absorbing, Emitting, and Scattering Media

NASA SP-164  
N71-30941 362 pp  
Avail GPO 1971

### Bioregenerative Systems

Bioregenerative life support systems for long duration space flights; hydrogenomonas biosynthesis and algae photosynthesis processes. Conference, November 1966.

NASA SP-165  
N68-26207 152 pp  
Avail NTIS 1968

### Surveyor VI: A Preliminary Report

Surveyor VI scientific data analysis.

NASA SP-166  
N68-21443 173 pp  
Avail NTIS 1968

### Significant Achievements in Space Science, 1967

Stellar astronomy, bioscience, ionospheres, planetology, particles and fields, solar physics, and planetary atmospheres.

NASA SP-167  
N69-25460 548 pp  
Avail GPO 1968

### Exploring Space With a Camera

*E. M. Cortright*

Spaceborne photography of cloud cover and other meteorological phenomena, Surveyor and Orbiter lunar shots, and Gemini space walk and target docking.

NASA SP-168

N68-34870 227 pp  
Avail GPO 1968

### Protection Against Space Radiation

*K. O'Brien, A. Reetz, Jr.*

Space radiation transport, spacecraft shielding design and advanced concepts, and methods for calculating radiation penetration through protective shields. Conference, June 1967.

NASA SP-169

N68-26128 627 pp  
Avail NTIS 1968

### Numerical Analysis

*R. H. Wilson, Jr.*

Numerical analysis applications to aerospace and related problems. Conference, January 1968.

NASA SP-170

N68-33245 46 pp  
Avail NTIS 1968

### Earth Photographs From Gemini VI Through XII

Color photographs of Earth taken during Gemini flights VI through XII.

NASA SP-171

N69-28909 335 pp  
Avail GPO 1968

### Batteries for Space Power Systems

*P. Bauer*

NASA development work on high efficiency batteries for space electric power systems.

NASA SP-172

N69-18042 314 pp  
Avail NTIS 1968

### Surveyor VII: A Preliminary Report

Principal scientific results on Surveyor VII lunar mission.

NASA SP-173

N68-33553 304 pp  
Avail NTIS 1968

### Conference on Electromagnetic Exploration of the Moon: June 11-13, 1968. Report of the Program Evaluation Committee

Proposed electromagnetic exploration of Moon. Conference, June 1968.

NASA SP-174

N69-33595 27 pp  
Avail NTIS 1969

### EXAMETNET Data Report Series Annual Report, 1966

Rocket sounding meteorological data of EXAMETNET for 1966.

NASA SP-175

N69-16214 190 pp  
Avail NTIS 1968

### EXAMETNET Data Report Series Annual Report, 1967

EXAMETNET meteorological rocket launchings and data dissemination, with tables.

NASA SP-176

N69-22570 188 pp  
Avail NTIS 1969

### Proceedings of the Working Group on Extraterrestrial Resources

Lunar environment, bases, exploration, and extraterrestrial resources. Conference, February 1968.

NASA SP-177

N69-22226 247 pp  
Avail NTIS 1968

### Langley, Ames, Lewis, and Flight Research Center Support of DOD VFAX/FX Projects Progress Report

NASA SP-178

X70-11968 186 pp  
1968

### The Book of Mars

*S. Glasstone*

Observations and theoretical studies of Mars properties.

NASA SP-179

N69-16571 307 pp  
Avail GPO 1968

### Second Conference on Sonic Boom Research

*I. R. Schwartz*

Sonic boom reduction in supersonic transport flight. Shock wave propagation and refraction, prediction methods for acoustic attenuation, aerodynamic engineering aspects. Conference, May 1968.

NASA SP-180

N68-34907 218 pp  
Avail NTIS 1968

### Interdisciplinary Approach to Friction and Wear

*P. M. Ku*

Structure, interactions, and topography of solid surfaces, sliding friction, adhesion, wear, and boundary lubrication. Conference, November 1967.

NASA SP-181

N69-30401 489 pp  
Avail GPO 1968

### **Problems and Programs on the Use of Submillimeter Waves in Space**

*M. R. Nagel*

Uses of submillimeter waves in aerospace technology, with bibliography.

NASA SP-182

N68-35522

49 pp

Avail NTIS

1968

### **Some Fluid Mechanical Problems Related to Subsonic and Supersonic Aircraft**

*J. T. Howe*

NASA SP-183

N69-10693

24 pp

Avail NTIS

1968

### **Surveyor: Program Results**

Summary of lunar data and scientific observations generated by Surveyor landings on Moon.

NASA SP-184

N69-36451

432 pp

Avail GPO

1969

### **A Study of NASA University Programs**

NASA university programs in personnel training, aeronautics and space research, and laboratories and research centers.

NASA SP-185

N68-35564

85 pp

Avail NTIS

1968

### **Theories of Equilibrium Figures of a Rotating Homogeneous Fluid Mass**

*Y. Hagihara*

Theory of equilibrium figures of rotating, homogeneous, incompressible fluid mass as applied to cosmology.

NASA SP-186

N71-33591

174 pp

Avail GPO

1970

### **Fourth Symposium on the Role of the Vestibular Organs in Space Exploration**

Etiology, symptomatology, and treatment of motion sickness with respect to vestibular organ and related neurological functions. Symposium, September 1968.

NASA SP-187

N70-30699

393 pp

Avail GPO

1970

### **CO<sub>2</sub>: Chemical, Biological, and Physiological Aspects**

*J. T. Edsall, R. E. Forster, A. B. Otis, et al.*

Molecular structure of carbonic anhydrase, enzymatic carboxylation, and respiratory gas exchange.

NASA SP-188

N70-23290

242 pp

Avail GPO

1969

### **Progress of NASA Research Relating to Noise Alleviation of Large Subsonic Jet Aircraft**

Nacelle acoustic linings, sound generation in jet engines, operational noise effects on humans. Conference, October 1968.

NASA SP-189

N69-11542

691 pp

Avail NTIS

1968

### **Mariner-Venus, 1967: Final Project Report**

Results and tracking and data acquisition for Mariner-Venus 1967 and Mariner-Venus 1967 extension projects.

NASA SP-190

N72-20809

310 pp

Avail GPO

1971

### **Average Evoked Potentials: Methods, Results, and Evaluations**

*E. Donchin, D. B. Lindsley*

Methods, results, and evaluation of research in average evoked potentials. Conference, September 1968.

NASA SP-191

N70-16876

410 pp

Avail GPO

1969

### **Fourth Annual NASA-University Conference on Manual Control**

Mathematical models of human performance in manual control of man-machine systems. Conference, March 1968.

NASA SP-192

N70-14876

573 pp

Avail NTIS

1969

### **Evaluation of Motion-Degraded Images**

Optical filters and digital methods for blurring removal from photographic imagery. Conference, December 1968.

NASA SP-193

N69-33322

178 pp

Avail GPO

1969

### **Liquid Propellant Rocket Combustion Instability**

*D. T. Harje*

Combustion instability in liquid propellant rocket engines.

NASA SP-194

N72-33729

Avail GPO

659 pp

1972

### **Significant Accomplishments in Science: Goddard Space Flight Center, 1968**

Investigation of Earth atmospheric composition, geomagnetism, extraterrestrial radiation, solar activity, and planetary atmospheres by satellite experiment and astronomical observations. Symposium, January 1969.

NASA SP-195

N69-38951

Avail NTIS

196 pp

1969

### **NASA Science and Technology Advisory Committee for Manned Space Flight: Proceedings of the Winter Study on Uses of Manned Space Flight 1975-1985**

Manned space flight capabilities for lunar and planetary explorations and Earth orbiting stations.

Volume I. Proceedings

NASA SP-196

N69-22510

Avail NTIS

45 pp

1969

Volume II. Appendixes

NASA SP-196

N70-17026

Avail NTIS

177 pp

1969

### **Lunar Orbiter I, Preliminary Results: Lunar Terrain Assessment and Selenodesy, Micrometeoroid, and Radiation Data**

*G. W. Brewer, J. K. Hughes*

Lunar Orbiter I terrain assessment photographs and preliminary selenodesy, micrometeoroid, and radiation data.

NASA SP-197

N69-39213

Avail NTIS

147 pp

1969

### **Atlas of Cometary Forms: Structures Near the Nucleus**

*B. Donn, J. Rahe, K. Wurm*

Atlas of drawings and photographs of comets.

NASA SP-198

N70-12260

Avail GPO

135 pp

1969

### **Lectures in High-Energy Astrophysics**

*H. B. Oegelman, J. R. Wayland, Jr.*

High-energy cosmic radiation problems.

NASA SP-199

N69-29652

Avail NTIS

170 pp

1969

### **The Moon as Viewed by Lunar Orbiter**

*F. El-Baz, L. J. Kosofsky*

Selected compilation of Lunar Orbiter photographs showing salient features of lunar surface.

NASA SP-200

N70-30817

Avail GPO

156 pp

1970

### **Analysis of Apollo 8 Photography and Visual Observations**

Apollo 8 observations of lunar topography.

NASA SP-201

N70-14366

Avail GPO

403 pp

1969

### **Aerospace Food Technology**

Operational and technological problems of improvement in space flight feeding for future manned space missions. Conference, April 1969.

NASA SP-202

N70-33835

Avail NTIS

215 pp

1970

### **Introduction to Abstract Analysis**

*M. E. Goldstein, B. M. Rosenbaum*

Introduction to abstract analysis by definitions and proofs.

NASA SP-203

N70-21801

Avail GPO

257 pp

1969

### **The Experiments of Biosatellite II**

*J. F. Saunders*

Experiments with invertebrates, plants, and cellular systems on Biosatellite II flight.

NASA SP-204

N72-20048

Avail GPO

358 pp

1971

### **Biotechnology**

Biotechnological problems on man-machine systems required for long duration space flights. Conference, August 1967.

NASA SP-205

N71-28526

Avail GPO

283 pp

1971

### **Lunar Orbiter Photographic Atlas of the Moon**

*D. E. Bowker, J. K. Hughes*

Atlas of reconstructed lunar photographs taken by Lunar Orbiters during 1966 and 1967.

NASA SP-206  
N73-13879 723 pp  
Avail GPO 1971

### **Basic Aerodynamic Noise Research**

*I. R. Schwartz*

Aerodynamic noise related to aircraft propulsion systems. Conference, July 1969.

NASA SP-207  
N70-22850 540 pp  
Avail GPO 1969

### **The Prevention of Electrical Breakdown in Spacecraft**

*D. Burrowbridge, F. W. Paul*

NASA SP-208  
N70-18656 103 pp  
Avail NTIS 1969

### **Applications of Research on Human Decision Making**

*R. M. Patton, J. A. Swets,  
T. A. Tanner, Jr.*

Human decision making in manned space flight including topics of memory models, signal detection, and pilot performance. Symposium, February 1968.

NASA SP-209  
N70-22743 198 pp  
Avail GPO 1970

### **Electric Propulsion Mission Analysis Nomenclature and Terminology**

Terminology for establishing system parameters of electric propulsion mission analysis.

NASA SP-210  
N70-11179 15 pp  
Avail NTIS 1969

### **Future Fields of Control Application**

Application of control theory to production engineering, transportation systems, urban development, biological oceanography, mass communications, and socio-economic problems. Conference, February 1969.

NASA SP-211  
N69-39957 144 pp  
Avail NTIS 1969

### **Progress of NASA Research on Warm Fog Properties and Modification Concepts**

Research on warm fog properties and dispersal concepts. Symposium, February 1969.

NASA SP-212  
N69-39526 127 pp  
Avail NTIS 1969

### **A Long-Range Program in Space Astronomy: Position Paper of the Astronomy Missions Board**

*R. O. Doyle*

Potential for advancement of astronomy by space programs.

NASA SP-213  
N69-41150 316 pp  
Avail GPO 1969

### **Apollo 11: Preliminary Science Report**

Preliminary scientific observations of Apollo 11 mission.

NASA SP-214  
N70-10030 209 pp  
Avail NTIS 1969

### **Fifth Annual NASA-University Conference on Manual Control**

Studies on display systems, optimal control methods, human performance theory, and neuromuscular models. Conference, March 1969.

NASA SP-215  
N70-30877 720 pp  
Avail NTIS 1970

### **Compressible Turbulent Boundary Layers**

Compressibility of turbulent boundary layers: skin friction, heat transfer, flow velocity, temperature distribution, pressure gradients, and aerodynamic drag prediction methods. Conference, December 1968.

NASA SP-216  
N70-10426 572 pp  
Avail NTIS 1969

### **Optical Space Communication**

*S. Karp, R. S. Kennedy*

Results of workshop on optical communication systems for space applications.

NASA SP-217  
N70-18087 154 pp  
Avail NTIS 1969



### **Analysis of a Jet in a Subsonic Crosswind**

Jet exhaust flow effects on aerodynamic characteristics of V/STOL aircraft during transition flight. Conference, September 1969.

NASA SP-218  
N70-11826 242 pp  
Avail NTIS 1969

### **Status of Passive Inflatable Falling-Sphere Technology for Atmospheric Sensing to 100 km**

Symposium, September 1969.

NASA SP-219  
N70-18570 307 pp  
Avail NTIS 1969

### **NASA Acoustically Treated Nacelle Program**

Program to reduce jet aircraft noise. Conference, October 1969.

NASA SP-220  
N70-13901 160 pp  
Avail NTIS 1969

### **The NASTRAN Theoretical Manual**

*R. H. MacNeal*

Finite element computer program for structural analysis.

NASA SP-221  
N70-42934 480 pp  
Avail COSMIC 1970

The NASTRAN Theoretical Manual (Level 15.0)

NASA SP-221 (01)  
N72-29920 601 pp  
Avail COSMIC 1972

The NASTRAN Theoretical Manual (Level 16)

NASA SP-221 (03)  
N76-73931 751 pp  
Avail COSMIC 1976

The NASTRAN Theoretical Manual (Level 17)

NASA SP-221 (04)  
Avail COSMIC 1979

### **The NASTRAN User's Manual**

*C. W. McCormick*

User manual for NASA structural analysis program to describe structural modeling techniques and computer programming operations.

NASA SP-222  
N70-41755 812 pp  
Avail COSMIC 1970

The NASTRAN User's Manual (Level 15.0)

NASA SP-222 (01)  
N72-29921 1540 pp  
Avail COSMIC 1973

### **The NASTRAN User's Manual (cont.)**

The NASTRAN User's Manual (Level 16)

NASA SP-222 (03)  
N76-73933 1240 pp  
Avail COSMIC 1976

The NASTRAN User's Manual (Level 17)

NASA SP-222 (04)  
N80-26694 867 pp  
Avail COSMIC 1979

The NASTRAN User's Manual (Level 17.5)

NASA SP-222 (05)  
Avail COSMIC 1980

### **The NASTRAN Programmer's Manual**

*F. J. Douglas*

Digital computer programs for analysis of large complex structures.

NASA SP-223  
N70-43143 1514 pp  
Avail COSMIC 1970

The NASTRAN Programmer's Manual (Level 15.0)

NASA SP-223 (01)  
N73-17892 2309 pp  
Avail COSMIC 1972

The NASTRAN Programmer's Manual (Level 16)

NASA SP-223 (03)  
N78-29505 3444 pp  
Avail COSMIC 1976

### **The NASTRAN Demonstration Problem Manual**

NASA SP-224  
N70-41756 134 pp  
Avail COSMIC 1970

The NASTRAN Demonstration Problem Manual (Level 15.0)

NASA SP-224 (01)  
N72-29919 187 pp  
Avail COSMIC 1972

The NASTRAN Demonstration Problem Manual (Level 16)

NASA SP-224 (03)  
N76-74317 259 pp  
Avail COSMIC 1976

The NASTRAN Demonstration Problem Manual (Level 17.5)

NASA SP-224 (05)  
Avail COSMIC 1980

### **Mariner-Mars 1969: A Preliminary Report**

Scientific data from Mariners 6 and 7 Mars flyby missions during 1969.

NASA SP-225  
N70-18343 148 pp  
Avail NTIS 1969

### **Plasmas and Magnetic Fields in Propulsion and Power Research**

Conference, October 1969.

NASA SP-226  
N70-18726 253 pp  
Avail NTIS 1970

### **Aerospace Structural Materials**

Development of aerospace structural materials: heat-resistant alloys, refractory materials, transition metals, and composite materials. Conference, November 1969.

NASA SP-227  
N70-20860 334 pp  
Avail NTIS 1970

### **Analytic Methods in Aircraft Aerodynamics**

Analysis of aircraft aerodynamic characteristics. Symposium, October 1969.

NASA SP-228  
N70-21351 750 pp  
Avail NTIS 1970

### **Proceedings of the 7th Annual Meeting of the Working Group on Extraterrestrial Resources**

Lunar water detection and removal, soil adhesion and friction, and other lunar and planetary resources recovery. Conference, July 1969.

NASA SP-229  
N70-39276 148 pp  
Avail GPO 1970

### **Ecological Surveys from Space**

Spaceborne photography using different combinations of film and filters for Earth resources surveys.

NASA SP-230  
N70-26981 80 pp  
Avail GPO 1970

### **EXAMETNET Data Report Series Annual Report, 1968**

Meteorological rocket launchings and data dissemination for 1968 from EXAMETNET.

NASA SP-231  
N70-29741 184 pp  
Avail NTIS 1970

### **Analysis of Apollo 10 Photography and Visual Observations**

Lunar geology, crater, and volcanic feature analysis from Apollo 10 visual observations and photo interpretations.

NASA SP-232  
N71-27871 231 pp  
Avail GPO 1971

### **Optical Telescope Technology**

Design optics and technology for large spaceborne astronomical telescopes. Workshop, May 1969.

NASA SP-233  
N70-36676 795 pp  
Avail NTIS 1970

### **Portable Life Support Systems**

Portable life support and environmental control systems. Conference, May 1969.

NASA SP-234  
N70-28501 380 pp  
Avail NTIS 1970

### **Apollo 12: Preliminary Science Report**

Preliminary scientific analyses of Apollo 12 ALSEP data, lunar photographs, and returned materials.

NASA SP-235  
N70-35271 235 pp  
Avail NTIS 1970

### **Research on Uranium Plasmas and Their Technological Applications**

*R. T. Schneider, K. Thom*

Uranium plasmas applied to nuclear rocket engines, MHD generators, nuclear lasers, and plasma stability and flow. Symposium, January 1970.

NASA SP-236  
N71-33626 503 pp  
Avail GPO 1971

### **Interdisciplinary Approach to the Lubrication of Concentrated Contacts**

*P. M. Ku*

Lubrication, wear, and design aspects of rolling contact bearings. Symposium, July 1969.

NASA SP-237  
N71-26826 595 pp  
Avail GPO 1970

### **Apollo 11 Mission Report**

Apollo 11 postflight analysis and mission report.

NASA SP-238  
N71-25042 228 pp  
Avail NTIS 1970

### **Kinetics and Thermodynamics in High-Temperature Gases**

Conference on kinetics and thermodynamics of combustion and high-temperature gases. Conference, March 1970.

NASA SP-239  
N70-32106 150 pp  
Avail NTIS 1970

### **The Mixed State of Superconductors**

*W. R. Hudson*

Mathematical models for mixed state of superconductors.

NASA SP-240

N71-10415 73 pp

Avail GPO 1970

### **Atlas and Gazetteer of the Near Side of the Moon**

*G. L. Gutschewski, D. C. Kinsler,  
E. Whitaker*

Atlas of annotated Lunar Orbiter 4 photographs of near side of Moon, with gazetteer.

NASA SP-241

N72-18820 539 pp

Avail GPO 1971

### **Guide to Lunar Orbiter Photographs**

*T. P. Hansen*

Lunar Orbiter photographs and maps, missions 1 through 5.

NASA SP-242

N71-36179 254 pp

Avail GPO 1970

### **Introduction to Experimental Techniques of High-Energy Astrophysics**

*H. Oegelman, J. R. Wayland*

Measurements of cosmic rays and high-energy extraterrestrial particles.

NASA SP-243

N71-11415 259 pp

Avail NTIS 1970

### **Power Processing**

*F. C. Schwarz*

Electrical engineering aspects of electric power processing and component technology.

NASA SP-244

N72-15229 53 pp

Avail GPO 1971

### **Recent Advances in Refractory Alloys for Space Power Systems Conference Papers**

Evaluation of refractory tantalum-, tungsten-, niobium-, and molybdenum-based alloys for space power systems applications. Conference, June 1969.

NASA SP-245

N71-13301 299 pp

Avail NTIS 1970

### **Lunar Photographs From Apollos 8, 10, and 11**

*R. G. Musgrove*

A catalog.

NASA SP-246

N71-29260 24 pp

Avail GPO 1971

### **The Development of Cryogenic Storage Systems for Space Flight**

*R. K. Allgeier, Jr., M. L. Davis,  
T. G. Rogers, et al.*

Development of cryogenic storage systems for manned space flight.

NASA SP-247

N71-30910 132 pp

Avail GPO 1970

### **Holographic Instrumentation Applications**

*R. M. Brown, B. Ragent*

Investigating possibilities and limitations of applying holographic techniques to aerospace technology. Conference, January 1970.

NASA SP-248

N71-12776 249 pp

Avail NTIS 1970

### **Cosmic Gamma Rays**

*F. W. Stecker*

Cosmic gamma ray production processes, galactic and extragalactic gamma rays, and cosmology.

NASA SP-249

N71-24764 231 pp

Avail GPO 1971

### **This Island Earth**

*O. W. Nicks*

Spaceborne photographs of Earth atmosphere, lands, and waters with photographs of Sun, Moon, and planets.

NASA SP-250

N71-12566 192 pp

Avail GPO 1970

### **Significant Accomplishments in Science and Technology: Goddard Space Flight Center, 1969**

Aerospace scientific and technological studies in 1969 for satellite systems and spacecraft missions.

NASA SP-251

N71-25256 376 pp

Avail NTIS 1970

### **The Entry Plasma Sheath and Its Effects on Space Vehicle Electromagnetic Systems. Volume I**

Plasma sheath diagnostics and reduction for improved reentry communication. Symposium, October 1970.

NASA SP-252

N71-21101 614 pp

Avail NTIS 1970

**The Entry Plasma Sheath and Its Effects on Space Vehicle Electromagnetic Systems. Volume 2**

Conference on entry plasma sheath and effects on space vehicle electromagnetic systems.

NASA SP-253 132 pp  
X71-10400 1970

**The Entry Plasma Sheath and Its Effects on Space Vehicle Electromagnetic Systems.**

Classified document.

NASA SP-254 122 pp  
X71-76576 1971

**Third Conference on Sonic Boom Research**

*I. R. Schwartz*

Prediction methods for sonic boom generation and propagation with overpressure minimization in supersonic transport design and operation. Conference, October 1970.

NASA SP-255 431 pp  
N71-28363 1971  
Avail GPO

**Astronomical Use of Television-Type Image Sensors**

*V. R. Boscarino*

Use of TV-type image sensors in astronomical photometry. Symposium, May 1970.

NASA SP-256 217 pp  
N71-28509 1971  
Avail NTIS

**A Search for Carbon and Its Compounds in Lunar Samples From Mare Tranquillitatis**

*K. A. Kvenvolden, C. Ponnamperuma*

Determination of carbon content of lunar samples from Apollo 11 flight.

NASA SP-257 127 pp  
N71-17964 1970  
Avail NTIS

**Performance and Dynamics of Aerospace Vehicles**

Performance, dynamics, and design of aeronautical and space vehicles.

NASA SP-258 670 pp  
N71-24701 1971  
Avail NTIS

**Aircraft Propulsion**

Conference, November 1970.

NASA SP-259 463 pp  
N71-19451 1971  
Avail NTIS

**NASTRAN: A Summary of the Functions and Capabilities of the NASA Structural Analysis Computer System**

*T. G. Butler, D. Michel*

Description of general purpose digital computer program for analysis of elastic structures under various loading conditions using finite element method approach.

NASA SP-260 27 pp  
N71-21559 1971  
Avail NTIS

**Preliminary Results From an Operational 90-Day Manned Test of a Regenerative Life Support System**

*D. C. Grana, A. O. Pearson*

Data from 90-day manned test of regenerative life support system in space station simulator. Symposium, November 1970.

NASA SP-261 579 pp  
N71-20951 1971  
Avail NTIS

**Animal Orientation and Navigation**

*S. R. Galler, K. Schmidt-Koenig, G. J. Jacobs, et al.*

Animal orientation and navigation capabilities. Symposium, September 1970.

NASA SP-262 586 pp  
N72-25062 1972  
Avail GPO

**The Mariner 6 and 7 Pictures of Mars**

*S. A. Collins, Jr.*

Mariner 6 and 7 imagery photographs of Mars.

NASA SP-263 168 pp  
N73-13878 1971  
Avail GPO

**Barium Releases at Altitudes Between 200 and 1000 Kilometers: A Joint MPI-NASA Experiment**

*D. Adamson, H. T. Baber, Jr., K. H. Crumbly*

Barium releases from Javelin and Nike-Tomahawk sounding rockets for ion cloud study of Earth electric and magnetic fields.

NASA SP-264 145 pp  
N71-29671 1971  
Avail NTIS

**Report of the Joint DOT-NASA Civil Aviation R&D Policy Study, March 1971**

Review of policies affecting civil aviation, problems confronting it, and potential for future contributions to national benefit.

NASA SP-265 104 pp  
N71-30506 1971  
Avail NTIS

### Joint DOT-NASA Civil Aviation Policy Study (Supporting Papers)

Civil aviation research and development projects noting characteristics and growth to date, current problems, future requirements, potential solutions, and recommendations.

NASA SP-266  
N71-30507 248 pp  
Avail NTIS 1971

### Physical Studies of the Minor Planets

*T. Gehrels*

Astronomical observations of asteroids. Conference, March 1971.

NASA SP-267  
N72-25753 713 pp  
Avail GPO 1971

### The Pioneer Mission to Jupiter

Planning for Pioneer interplanetary missions with Jupiter flyby.

NASA SP-268  
N71-32366 48 pp  
Avail GPO 1971

### Hypogravic and Hypodynamic Environments

*M. McCally, R. H. Murray*

Aerospace environments, manned space flight, weightlessness simulation, musculo-skeletal and cardiovascular systems, bone loss, mineral metabolism, and hematology. Conference, July 1969.

NASA SP-269  
N71-33251 380 pp  
Avail NTIS 1971

### NASA Aircraft Safety and Operating Problems. Volume 1

Conference, May 1971.

NASA SP-270  
N71-30756 444 pp  
Avail NTIS 1971

### NASA Aircraft Safety and Operating Problems. Volume 2

NASA aircraft safety and operational problems of high altitude supersonic cruise aircraft. Conference, May 1971.

NASA SP-271  
X71-10673 50 pp  
1971

### Apollo 14 Preliminary Science Report

Lunar topographic, geologic, magnetic field, gravitation, and atmospheric data from Apollo 14 experiments and photography.

NASA SP-272  
N71-30953 313 pp  
Avail GPO 1971

### Computer Program for Calculation of Complex Chemical Equilibrium Composition, Rocket Performance, Incident and Reflected Shocks, and Chapman-Jouguet Detonations

*S. Gordon, B. J. McBride*

Equations and computer program for calculating chemical equilibria in thermodynamic states of complex systems.

NASA SP-273  
N71-37775 250 pp  
Avail NTIS 1971

### A Compilation of Nondimensional Numbers

*N. S. Land*

Identification and compilation of named nondimensional numbers used in technical areas.

NASA SP-274  
N72-23982 126 pp  
Avail GPO 1972

### Monitoring Earth Resources from Aircraft and Spacecraft

*R. N. Colwell*

Procedures and techniques for determining Earth resources from high altitude aircraft and Apollo 9 photographs.

NASA SP-275  
N72-18331 203 pp  
Avail GPO 1971

### Spacecraft Charge Buildup Analysis

*H. W. Biskay, J. V. Gore,*

*M. A. Kasha, et al.*

Design and characteristics of spacecraft propulsion system using charge buildup and electric propulsion techniques.

NASA SP-276  
N71-32812 40 pp  
Avail NTIS 1971

### Friction, Wear, and Lubrication in Vacuum

*D. H. Buckley*

Friction, wear, and lubrication of metals, nonmetal compounds, and polymers in vacuum environment.

NASA SP-277  
N72-20451 192 pp  
Avail NTIS 1971

### The Interplanetary Pioneers. Volume I. Summary

*W. R. Corliss*

Pioneer space probe project to show history, design, development, flight operations, and results accomplished.

NASA SP-278  
N73-14864 135 pp  
Avail GPO 1972

**The Interplanetary Pioneers.  
Volume II. System Design and  
Development**

*W. R. Corliss*

Pioneer space probe system design and development, ground support system, tracking and communication, and data processing.

NASA SP-279  
N73-17882 312 pp  
Avail GPO 1972

**The Interplanetary Pioneers.  
Volume III. Operations**

*W. R. Corliss*

Operational aspects of Pioneer program.

NASA SP-280  
N73-20882 157 pp  
Avail GPO 1972

**Seventh Annual Conference on Manual  
Control**

Manual control systems for human operator modeling and display systems in man-machine environments. Conference, June 1971.

NASA SP-281  
N73-10104 354 pp  
Avail GPO 1972

**The Fifth Aerospace Mechanisms  
Symposium**

Structural design principles and mechanical engineering methods for aerospace mechanisms used in orbital and space flights. Conference, June 1970.

NASA SP-282  
N72-13391 196 pp  
Avail NTIS 1971

**Earth Resources Survey Systems**

Applications of remote sensing to agriculture, forestry, oceanography, urban development. Workshop, May 1971.

NASA SP-283  
N73-16348 359 pp  
Avail GPO 1972

**Analysis of Surveyor 3 Material and  
Photographs Returned by Apollo 12**

Postflight analysis of parts from Surveyor 3 spacecraft, lunar material, and photographs brought back on Apollo 12 flight.

NASA SP-284  
N72-26731 302 pp  
Avail GPO 1972

**Remote Measurement of Pollution**

Remote sensing techniques for measuring gaseous air pollution, water pollution, and particulate air pollution.

NASA SP-285  
N72-18324 261 pp  
Avail NTIS 1971

**Significant Accomplishments in Science:  
Goddard Space Flight Center, 1970**

Research in Earth resources, meteorology, and interplanetary physics. Symposium, January 1971.

NASA SP-286  
N72-23324 253 pp  
Avail NTIS 1972

**What Made Apollo a Success?**

Apollo spacecraft development, mission planning, and flight operations.

NASA SP-287  
N72-12892 87 pp  
Avail NTIS 1971

**Vibration of Shells**

*A. W. Leissa*

Vibrational characteristics, mechanical properties, and stress analysis of thin shell structures of various cross sections.

NASA SP-288  
N73-26924 435 pp  
Avail GPO 1973

**Apollo 15: Preliminary Science Report**

Apollo 15 flight accomplishments, lunar surface activities, lunar orbital activities, and photographic coverage.

NASA SP-289  
N72-22814 502 pp  
Avail GPO 1972

**Turbine Design and Application**

*A. J. Glassman*

Review of turbine technology including thermodynamics, compressible fluid mechanics, fundamental turbine concepts, and velocity diagram design.

**Volume I**

NASA SP-290  
N72-26685 101 pp  
Avail GPO 1972

**Volume II**

NASA SP-290  
N74-33476 152 pp  
Avail GPO 1973

**Volume III**

NASA SP-290  
N75-24741 141 pp  
Avail GPO 1975

### **The Transformation of Scientists and Engineers Into Managers**

*J. A. Bayton, R. L. Chapman*

Principal problems and obstacles faced by specialists during the transition period when they are becoming managers.

NASA SP-291  
N72-27986 135 pp  
Avail GPO 1972

### **Vehicle Technology for Civil Aviation: The Seventies and Beyond**

Technological concepts for future transport aircraft developments in civil aviation. Conference, November 1971.

NASA SP-292  
N72-12995 452 pp  
Avail NTIS 1971

### **Experimental InterAmerican Meteorological Rocket Network (EXAMETNET): The First Five Years, 1966-1970**

Five-year assessment of EXAMETNET, meteorological rocket network of Argentina, Brazil, and United States for stratospheric soundings.

NASA SP-293  
N72-17558 58 pp  
Avail NTIS 1972

### **Remote Sensing of the Chesapeake Bay**

Remote sensing of resources contained in Chesapeake Bay to determine effects of environmental pollution. Conference, April 1971.

NASA SP-294  
N72-26272 176 pp  
Avail GPO 1972

### **Significant Accomplishments in Technology: Goddard Space Flight Center, 1970**

*J. M. Bridger*

Technological developments in satellite communications, tracking, antenna arrays, attitude control, orbit calculations, and instrumentation. Symposium, January 1971.

NASA SP-295  
N72-25755 214 pp  
Avail NTIS 1972

### **Rocket/Nimbus Sounder Comparison (RNSC)**

Radiance and temperature differences between rocket and Nimbus satellite systems.

NASA SP-296  
N72-19892 46 pp  
Avail NTIS 1972

### **Numerical Marching Techniques for Fluid Flows With Heat Transfer**

*R. W. Hornbeck*

Formulations and solutions for fluid flow problems with associated heat transfer.

NASA SP-297  
N74-12992 349 pp  
Avail GPO 1973

### **Space Simulation**

Symposium, May 1972.

NASA SP-298  
N72-22250 1093 pp  
Avail GPO 1972

### **Holography and Optical Filtering**

Holography and optical filtering techniques for structural analysis, material tests, and astronomical observation. Conference, May 1971.

NASA SP-299  
N73-25540 195 pp  
Avail GPO 1973

### **Physics of the Solar System**

*S. I. Rasool*

Solar system, solar physics, planetary atmospheres and structure, and origin of planets and Moon.

NASA SP-300  
N72-25810 519 pp  
Avail GPO 1972

### **Supercritical Wing Technology: A Progress Report on Flight Evaluations**

Supercritical wing development and results of F-8 and T-2C test programs. Symposium, February 1972.

NASA SP-301  
X72-10196 141 pp  
1972

### **Second Conference on Portable Life Support Systems**

Portable life support systems for human protection. Conference, May 1971.

NASA SP-302  
N72-27106 350 pp  
Avail NTIS 1972

### **The Quiet Sun**

*E. G. Gibson*

Textbook of solar physics.

NASA SP-303  
N73-25846 344 pp  
Avail GPO 1973

### Fluid Mechanics, Acoustics, and Design of Turbomachinery

*B. Lakshminarayana, W. R. Britsch,  
W. S. Gearhart*

#### Part 1

NASA SP-304  
N75-11174 419 pp  
Avail GPO 1974

#### Part 2

NASA SP-304  
N75-11191 447 pp  
Avail GPO 1974

### Physics of the Space Environment

*R. E. Smith, S. T. Wu*

Upper atmospheric physics and chemistry, auroras, and solar flare forecasting. Colloquium, 1971.

NASA SP-305  
N72-31384 176 pp  
Avail NTIS 1972

### Compositions of Major and Minor Minerals in Five Apollo 12 Crystalline Rocks

*B. M. French, K. F. J. Heinrich,  
P. D. Loman, Jr., et al.*

Mineral analysis of lunar samples of crystalline rocks from Apollo 12 flight.

NASA SP-306  
N73-16837 145 pp  
Avail NTIS 1972

### Report of the Tape Recorder Action Plan Committee, March 13, 1972

Failure analysis of tape recorders for spacecraft applications.

NASA SP-307  
N73-15225 52 pp  
Avail NTIS 1972

### Solar Wind

*C. P. Sonett, P. J. Coleman, Jr.,  
J. M. Wilcox*

Magnetic structure of interplanetary and solar magnetic fields and solar wind. Conference, March 1971.

NASA SP-308  
N73-10760 728 pp  
Avail GPO 1972

### Advanced Approaches to Fatigue Evaluation

Fatigue test evaluation for aircraft structures. Symposium, May 1971.

NASA SP-309  
N72-29895 675 pp  
Avail NTIS 1972

### The Scientific Results From the Orbiting Astronomical Observatory (OAO-2)

*A. D. Code*

Scientific observations by OAO of solar system, interstellar matter, stellar atmospheres, and galactic and extragalactic systems. Conference, August 1971.

NASA SP-310  
N72-31810 597 pp  
Avail NTIS 1972

### Aircraft Engine Noise Reduction

Conference, May 1972.

NASA SP-311  
N73-12012 321 pp  
Avail NTIS 1972

### Significant Accomplishments in Sciences: Goddard Space Flight Center, 1971

Research on remote sensing applications and satellite observation data. Symposium, November 1971.

NASA SP-312  
N73-17934 220 pp  
Avail NTIS 1972

### Space for Mankind's Benefit

*J. Vonputtkamer, T. J. McCullough*

Conference, November 1971.

NASA SP-313  
N73-13829 415 pp  
Avail GPO 1972

### Fifth Symposium on the Role of the Vestibular Organs in Space Exploration

Vestibular problems of manned space flight for weightlessness and reduced gravity conditions with emphasis on space station development, including morphological studies. Symposium, August 1970.

NASA SP-314  
N74-18754 275 pp  
Avail GPO 1973

### Apollo 16 Preliminary Science Report

Preliminary results of Apollo 16 investigations.

NASA SP-315  
N73-21729 636 pp  
Avail GPO 1972

### Advanced Methods for the Solution of Differential Equations

*M. E. Goldstein, W. H. Braun*

NASA SP-316  
N74-10569 359 pp  
Avail GPO 1973



### **Stellar Chromospheres**

*S. D. Jordan, E. H. Avrett*

Stellar chromospheres and their compositions. Colloquium, February 1972.

NASA SP-317

N73-13792 318 pp

Avail GPO 1973

### **Interdisciplinary Approach to Liquid Lubricant Technology**

*P. M. Ku*

Requirements and functions of liquid lubricants, mineral oils, greases, theory of rheology, mechanics and thermodynamics in lubrication, environmental capability of liquid lubricants, wear corrosion and erosion. Symposium, January 1972.

NASA SP-318

N74-12219 569 pp

Avail GPO 1973

### **Evolutionary and Physical Properties of Meteoroids**

*C. L. Hemenway, P. M. Millman,*

*A. F. Cook*

Astrophysical models for meteoroid formation and stellar and planetary evolutions developed from simulation composition studies. Colloquium, June 1971.

NASA SP-319

N74-19436 361 pp

Avail GPO 1973

### **STOL Technology**

Aerodynamic characteristics and short haul transportation applications. Conference, October 1972.

NASA SP-320

N73-32934 516 pp

Avail NTIS 1972

### **Free Turbulent Shear Flows**

*S. F. Birch*

Development of data, including two-dimensional shear layers and axisymmetric jets. Conference, July 1972.

Volume I. Conference Proceedings

NASA SP-321

N73-28154 763 pp

Avail NTIS 1973

Volume II. Summary of Data

NASA SP-321

N73-27213 94 pp

Avail NTIS 1973

### **A Review of Methods for Predicting Air Pollution Dispersion**

*J. J. Mathis, Jr., W. L. Grose*

Air pollution models, and problem areas in air pollution dispersion modeling.

NASA SP-322

N73-20658 46 pp

Avail NTIS 1973

### **Accelerated Testing of Space Batteries**

*J. McCallum, R. E. Thomas,*

*J. H. Waite*

Accelerated life test program for space batteries.

NASA SP-323

N73-21958 220 pp

Avail NTIS 1973

### **Project Management in NASA: The System and the Men**

*R. H. Pontious, L. B. Barnes*

NASA SP-324

N74-15692 137 pp

Avail GPO 1973

### **The Orbital Mechanics of Flight Mechanics**

*R. S. Dunning*

Reference handbook on modern dynamic orbit theory.

NASA SP-325

N74-12482 164 pp

Avail NTIS 1973

### **Significant Accomplishments in Technology: Goddard Space Flight Center, 1972**

Technology utilization in spacecraft guidance, ground operations, communications and navigation systems, and sensor development. Symposium, November 1972.

NASA SP-326

N73-27816 186 pp

Avail NTIS 1973

### **Significant Results Obtained From the Earth Resources Technology Satellite-1. Volume I: Technical Presentations**

*S. C. Freden, E. P. Mercanti,*

*M. A. Becker*

Symposium, March 1973.

NASA SP-327

N73-28207 1686 pp

Avail GPO 1973

### **Life Beyond Earth and the Mind of Man**

*R. Berendzen*

Social, philosophical, and humanistic impacts of possible existence of extraterrestrial life. Symposium, November 1972.

NASA SP-328  
N73-30807 110 pp  
Avail GPO 1973

### **Mars as Viewed by Mariner 9**

Photographs of the surface of Mars showing geologic features and effects of atmospheric phenomena.

NASA SP-329  
N75-17270 279 pp  
Avail GPO 1974

### **Apollo 17 Preliminary Science Report**

Apollo 17 site selection, mission description, geological investigation of landing site, lunar experiments, visual flight flash phenomenon, volcanic studies, mare ridges, remote sensing and photogrammetric studies, astronomical photography.

NASA SP-330  
N74-18428 677 pp  
Avail GPO 1973

### **Significant Accomplishments in Sciences: Goddard Space Flight Center, 1972**

Space applications research in astronomy and earth physics.

NASA SP-331  
N73-31867 223 pp  
Avail NTIS 1973

### **The Gum Nebula and Related Problems**

Symposium, May 1971.

NASA SP-332  
N73-31731 246 pp  
Avail NTIS 1973

### **Design of Various Fixed-Geometry Water-Lubricated Hydrodynamic Journal Bearings for Maximum Stability**

*F. T. Schuller*

NASA SP-333  
N74-11305 101 pp  
Avail NTIS 1973

### **The Viking Mission to Mars**

Preview of the mission.

NASA SP-334  
N74-34287 82 pp  
Avail NTIS 1974

### **Advanced Scanners and Imaging Systems for Earth Observations**

Electromechanical scanners, self-scanned solid state sensors, electron beam images, sensor related technology, user applications.

NASA SP-335  
N74-11287 620 pp  
Avail GPO 1973

### **Seventh Conference on Space Simulation**

Conference, November 1973.

NASA SP-336  
N74-10232 935 pp  
Avail GPO 1973

### **The New Mars: The Discoveries of Mariner 9**

*W. K. Hartmann, O. Raper*

A history of our knowledge of Mars—how we gained it and how it grew.

NASA SP-337  
N75-13729 192 pp  
Avail GPO 1974

### **Advanced Electro-Optical Imaging Techniques**

*S. Sobieski, E. J. Wampler*

Symposium, September 1972.

NASA SP-338  
N74-17406 134 pp  
Avail NTIS 1973

### **Gamma-Ray Astrophysics**

*F. W. Stecker, A. I. Trombka*

Symposium, May 1973.

NASA SP-339  
N74-14465 425 pp  
Avail GPO 1973

### **The Atmosphere of Titan**

*D. M. Hunten*

Spectroscopic and radiometric observations used to form models for the Titan atmospheric composition and circulation.

NASA SP-340  
N74-20478 185 pp  
Avail NTIS 1974

### **Atlas of Surveyor 5 Television Data**

*R. M. Batson, R. Jordan,  
K. B. Larson*

NASA SP-341  
N75-14665 609 pp  
Avail GPO 1974

### **High Energy Phenomena on the Sun**

*R. Ramaty, R. G. Stone*

Symposium, September 1972.

NASA SP-342  
N74-21440 640 pp  
Avail GPO 1973

### **The Rings of Saturn**

*F. D. Palluconi, G. H. Pettengill*

Preview of Mariner Jupiter-Saturn '77 space project. Workshop, August 1973.

NASA SP-343

N75-17236

Avail GPO

221 pp

1974

### **Objectives and Models of the Planetary Quarantine Program**

*M. Werber*

Objectives of the planetary quarantine program and the history of early contamination prevention efforts.

NASA SP-344

N75-25604

Avail GPO

140 pp

1975

### **Evolution of the Solar System**

*H. Alfvén, G. Arrhenius*

Physical process and experimental studies related to the origin and evolution of the solar system.

NASA SP-345

N77-12959

Avail GPO

611 pp

1976

### **Aeroacoustics**

*M. E. Goldstein*

NASA SP-346

N74-35118

Avail NTIS

440 pp

1974

### **Aerodynamic Analyses Requiring Advanced Computers**

Conference, March 1975.

Part 1

NASA SP-347

N76-10007

Avail NTIS

710 pp

1975

Part 2

NASA SP-347

N76-10031

Avail NTIS

779 pp

1975

### **Radiative Property Data for Venusian Entry: A Compendium**

*J. J. Jones, R. E. Boughner,  
K. V. Haggard, et al.*

NASA SP-348

N75-12880

Avail NTIS

85 pp

1974

### **Pioneer Odyssey: Encounter With a Giant**

*R. O. Fimmel, W. Swindell,  
E. Burgess*

Pioneer Jupiter mission objectives, hazards, spacecraft design, communication techniques, mission accomplishments, scientific payloads. (The Pioneer flyby of Saturn is included in NASA SP-446.)

NASA SP-349

N75-10130

Avail GPO

183 pp

1974

### **Apollo Expeditions to the Moon**

*E. M. Cortright*

From planning stages through Apollo 17. The objectives and accomplishments of each mission are discussed.

NASA SP-350

N76-12956

Avail GPO

324 pp

1975

### **Third Earth Resources Technology Satellite-1 Symposium. Volume 1: Technical Presentations, Section A**

*S. C. Freden, E. P. Mercanti,  
M. A. Becker*

Symposium, December 1973.

NASA SP-351

N74-30705

Avail GPO

992 pp

1974

### **Third Earth Resources Technology Satellite-1 Symposium. Volume 1: Technical Presentations, Section B**

*S. C. Freden, E. P. Mercanti,  
M. A. Becker*

NASA SP-351

N74-30774

Avail GPO

936 pp

1974

### **Rotorcraft Dynamics**

A dynamic structural analysis of rotary winged aircraft considering helicopter vibration and loads. Conference, February 1974.

NASA SP-352

N74-34489

Avail NTIS

370 pp

1974

### **Corn Blight Watch Experiment. Summary Report**

NASA SP-353

N74-33861

Avail GPO

17 pp

1974

**DOT/NASA Comparative Assessment  
of Brayton Engines for Guideway  
Vehicles and Buses**

Volume I. Summary

NASA SP-354  
N75-18577 47 pp  
Avail NTIS 1975

Volume II. Analysis and Results

NASA SP-354  
N75-22745 284 pp  
Avail NTIS 1975

**Comet Kohoutek**

*G. A. Gary*

Tail form, structure, and evolution; hydroxyl related observations; molecules and atoms in the coma and tail; photometry and radiometry; spacecraft and ground-based observation data. Color photographs. Workshop, June 1974.

NASA SP-355  
N76-10938 281 pp  
Avail NTIS 1975

**Third Earth Resources Technology  
Satellite-1 Symposium. Volume II:  
Summary of Results**

*S. C. Freden, E. P. Mercanti,  
D. B. Friedman*

Results and applications of ERTS-1 data for solving resource management problems. Symposium, December 1973.

NASA SP-356  
N75-10549 184 pp  
Avail GPO 1974

**Third Earth Resources Technology  
Satellite-1 Symposium. Volume III:  
Discipline Summary Report**

*S. C. Freden, E. P. Mercanti,  
D. B. Friedman*

Agriculture, forestry, and range resources; land use and mapping; mineral resource, geological structure, and landform surveys; water and marine resources; environmental surveys; interpretation techniques. Symposium, December 1973.

NASA SP-357  
N74-33873 159 pp  
Avail GPO 1974

**Wave Climate Model of the Mid-  
Atlantic Shelf and Shoreline (Virginian  
Sea): Model Development, Shelf Geo-  
morphology, and Preliminary Results**

*V. Goldsmith, W. D. Morris,  
R. J. Byrne, et al.*

Computerized wave climate model that applies linear wave theory and shelf depth information to predict wave behavior.

NASA SP-358  
N75-23072 153 pp  
Avail NTIS 1974

**Monterey Bay Study**

*R. M. Bizzell, L. C. Wade*

Usefulness of Landsat system in the planning and development of resource systems on Earth.

NASA SP-359  
N75-30629 33 pp  
Avail GPO 1975

**Mission to Earth: Landsat Views the  
World**

*N. M. Short, P. D. Lowman, Jr.,  
S. C. Freden, et al.*

Four hundred color plates showing land cultural features.

NASA SP-360  
N77-17532 926 pp  
Avail GPO 1976

**Educator's Guide for Mission to Earth:  
Landsat Views the World**

*M. A. Tindal*

Information for using Landsat imagery to aid in teaching earth science and geology, environmental studies, geography, social and urban studies.

Supplement to NASA SP-360  
N80-10537 56 pp  
Avail GPO 1978

**Significant Accomplishments in Science  
and Technology: Goddard Space Flight  
Center, 1973**

Cometary physics, x-ray and gamma ray astronomy, solar and terrestrial physics, spacecraft technology, Earth Resources Technology Satellite (Landsat), Earth and ocean physics, communications and navigation, mission operations and data systems, network systems and operations. Symposium, December 1973.

NASA SP-361  
N75-16422 360 pp  
Avail NTIS 1975

### **Apollo Over the Moon: A View From Orbit**

*H. Masursky, G. W. Colton,  
F. El-Baz, et al.*

Photographs taken by the Apollo metric camera system.

NASA SP-362

N78-21174 263 pp  
Avail GPO 1978

### **Technology and the Neurologically Handicapped**

Bioengineering approaches to the treatment of neurologically handicapped persons; neurophysiological aspects of control systems and man-machine integration. Conference, September 1971.

NASA SP-363

N75-19975 278 pp  
Avail NTIS 1975

### **Data Collection System: Earth Resources Technology Satellite-1**

*S. Cooper, P. T. Ryan*

Sensors, interface hardware, power supplies, environmental enclosures, data transmission, processing and distribution, maintenance and integration in resources management systems. Conference, May 1973.

NASA SP-364

N75-16050 127 pp  
Avail NTIS 1975

### **National Geodetic Satellite Program**

*S. W. Henrikson*

Instruments used to obtain data, description of data, data processing theory, evaluation of results.

#### **Part 1**

NASA SP-365

N78-11545 523 pp  
Avail NTIS 1977

#### **Part 2**

NASA SP-365

N78-11552 509 pp  
Avail GPO 1977

### **Possible Relationships Between Solar Activity and Meteorological Phenomena**

*W. R. Bandeen, S. P. Maran*

Symposium, November 1973.

NASA SP-366

N76-14528 263 pp  
Avail GPO 1975

### **Introduction to the Aerodynamics of Flight**

*T. A. Talay*

The atmosphere, fluid flow, subsonic flow effects, transonic flow, supersonic flow, aircraft performance, and stability and control.

NASA SP-367

N76-11043 203 pp  
Avail NTIS 1975

### **Biomedical Results From Apollo**

*R. S. Johnston, L. F. Dietlein,  
C. A. Berry*

Crew health and inflight monitoring, preflight and postflight medical testing, inflight experiments, quarantine, and life support systems.

NASA SP-368

N76-12668 592 pp  
Avail GPO 1975

### **Forced-Flow Once-Through Boilers: NASA Research**

*J. R. Stone, V. H. Gray,  
O. A. Gutierrez*

Research on boilers for use in spacecraft electrical power generation systems.

NASA SP-369

N75-32388 142 pp  
Avail NTIS 1975

### **The Soviet-American Conference on Cosmochemistry of the Moon and Planets**

*J. H. Pomeroy, N. J. Hubbard*

Thermal history of the Moon; lunar gravitation and magnetism; chronology of the moon, planets, and meteorites; hypotheses about the origin and evolution of the Moon and planets; data on Mercury, Venus, Mars, Jupiter. Conference, June 1974.

#### **Part 1**

NASA SP-370

N78-12925 503 pp  
Avail GPO 1977

#### **Part 2**

NASA SP-370

N78-12958 423 pp  
Avail GPO 1977

### **Large Scale Dynamic Systems**

Large scale dynamic systems in terms of modern control theory in the fields of aeronautics, water resources, and electrical power. Workshop, August 1974.

NASA SP-371

N75-29845 206 pp  
Avail NTIS 1975

#### **NASA-University Conference on Aeronautics**

Aeronautics and the education of the engineers, technical trends in aeronautics, and the role of the university in aeronautics. Conference, October 1974.

NASA SP-372  
N75-29001 430 pp  
Avail NTIS 1975

#### **Free Radical OH: A Molecule of Astrophysical and Aeronomic Interest**

*H. Sbardanand Mohan*

Rotational-vibrational transitions, dissociation and ionization processes, and spectral characteristics.

NASA SP-373  
N75-29960 90 pp  
Avail NTIS 1975

#### **Foundations of Space Biology and Medicine**

*M. Calvin, O. G. Gazenko*

Volume I. Space as a Habitat

NASA SP-374  
N76-26799 458 pp  
Avail GPO 1975

Volume II. Ecological and Physiological Bases of Space Biology and Medicine

Book 1

NASA SP-374  
N76-26809 415 pp  
Avail GPO 1975

Book 2

NASA SP-374  
N76-26819 756 pp  
Avail GPO 1975

Volume III. Space Medicine and Biotechnology

NASA SP-374  
N76-26829 542 pp  
Avail GPO 1975

#### **The Use of Lasers for Hydrographic Studies**

*H. H. Kim, P. T. Ryan*

Use of remote laser sensors in water pollution detection and identification, coastal environment monitoring, bathymetric depth sounding. Symposium, September 1973.

NASA SP-375  
N75-30525 202 pp  
Avail NTIS 1975

#### **Active Microwave Workshop Report**

*R. E. Matthews*

Data on active microwave systems. Remote sensing of Earth/land features, ocean/atmosphere interactions, equipment and instrument technology. Workshop, July 1974.

NASA SP-376  
N76-11811 513 pp  
Avail GPO 1975

#### **Biomedical Results From Skylab**

*R. S. Johnston, L. F. Dietlein*

Physiological responses of space crew to prolonged space flight stress.

NASA SP-377  
N77-33780 502 pp  
Avail GPO 1977

#### **Numerical Studies of Incompressible Viscous Flow in a Driven Cavity**

Numerical methods that can be applied to the Navier-Stokes equations; cubic spline procedure.

NASA SP-378  
N76-16023 132 pp  
Avail NTIS 1975

#### **Eighth Conference on Space Simulation**

State of the art in space simulation spacecraft contamination, thermal control systems, biosciences, flammability. Conference, November 1975.

NASA SP-379  
N76-11113 859 pp  
Avail NTIS 1975

#### **Skylab Explores the Earth**

Experiments to determine the types of data obtainable through visual observation by Skylab crews.

NASA SP-380  
N77-28548 531 pp  
Avail GPO 1977

#### **Aeronautical Propulsion**

Engine design, exhaust gases, use of composites, bearings, supersonic and hypersonic propulsion. Conference, May 1975.

NASA SP-381  
N75-31068 476 pp  
Avail NTIS 1975

#### **The Atmosphere of Venus**

*J. E. Hansen*

Dynamics, structure, chemistry and evolution of the atmosphere of Venus. Conference, October 1974.

NASA SP-382  
N76-10933 202 pp  
Avail NTIS 1975

### **Cepheid Modeling**

*D. Fischel, W. M. Sparks*

Mathematical techniques used to model the instability behavior of cepheid variables. Conference, July 1974.

NASA SP-383  
N76-10951 338 pp  
Avail NTIS 1975

### **Significant Accomplishments in Science and Technology: Goddard Space Flight Center, 1974**

Earth resources and astronomy; photographs of satellite observations. Symposium, December 1974.

NASA SP-384  
N76-10934 208 pp  
Avail NTIS 1975

### **Proceedings of the 1958 Flight Flutter Testing Symposium**

Theory, methods, and techniques of flight flutter testing. Symposium, May 1958.

NASA SP-385  
N76-10095 196 pp  
Avail NTIS 1975

### **Outlook for Space: Report to the NASA Administrator by the Outlook for Space Study Group**

Future activities in the context of national needs, 1980-2000.

NASA SP-386  
N76-18004 373 pp  
Avail GPO 1976

### **A Forecast of Space Technology: 1980-2000**

Information management, scientific resources, management of energy and matter.

NASA SP-387  
N76-18005 320 pp  
Avail GPO 1976

### **Analytical Applications of Bioluminescence and Chemiluminescence**

*E. W. Chappelle, G. L. Picciolo*

NASA SP-388  
N76-15538 119 pp  
Avail NTIS 1975

### **X-Ray Binaries**

Satellite x-ray experiments and ground-based programs aimed at observation of x-ray binaries. Symposium, October 1975.

NASA SP-389  
N76-26056 718 pp  
Avail NTIS 1976

### **Applications of Computer Graphics in Engineering**

Conference, October 1975.

NASA SP-390  
N76-16812 661 pp  
Avail NTIS 1975

### **Operational Applications of Satellite Snowcover Observations**

*A. Rango*

Snow measurements made by Landsat and NOAA satellites were used to help forecast runoff and flooding. Conference, August 1975.

NASA SP-391  
N76-16561 430 pp  
Avail NTIS 1975

### **The Space Telescope**

Mission planning, telescope performance, optical detectors, mirror construction, pointing and control systems, data management, and maintenance of the telescope. Meeting, August 1975.

NASA SP-392  
N76-23110 240 pp  
Avail GPO 1976

### **The Study of Comets**

*B. Donn, M. J. Mumma,  
W. M. Jackson, et al.*

Photometry and spectrum analysis of Kohoutek comet and comet tails. Colloquium, November 1974.

Part 1  
NASA SP-393  
N76-21052 557 pp  
Avail GPO 1976

Part 2  
NASA SP-393  
N76-21075 557 pp  
Avail GPO 1976

### **A Survey of Computational Aerodynamics in the United States**

*A. Gessow, D. J. Morris*

Programs in theoretical and computational aerodynamics, including application for boundary layer flow, Navier-Stokes turbulence modeling, internal flows, two-dimensional configurations, subsonic and supersonic aircraft, transonic aircraft, and the Space Shuttle.

NASA SP-394  
N78-11007 49 pp  
Avail NTIS 1977

### **Second NASA Conference on Laser Energy Conversion**

*K. W. Billman*

The possible transmission of high-power laser beams over long distances and their conversion to thrust, electricity, and other useful forms of energy. Conference, January 1975.

NASA SP-395  
N76-21505 196 pp  
Avail NTIS 1976

### **Solar-Wind Interaction With the Planets Mercury, Venus, and Mars**

*N. F. Ness*

Magnetic field and plasma measurements in the environments of Mars, Mercury, and Venus. Seminar, November 1975.

NASA SP-397  
N76-25125 172 pp  
Avail NTIS 1976

### **The 1976 Standard Atmosphere Above 86-km Altitude**

*R. A. Minzner*

Development of an atmospheric model, temperature and composition profiles.

NASA SP-398  
N77-10755 77 pp  
Avail NTIS 1976

### **Skylab EREP Investigations Summary**

*W. J. Pierson*

EREP data on agriculture, cartography, geology, hydrology, oceans atmosphere.

NASA SP-399  
N79-17279 387 pp  
Avail GPO 1978

### **Skylab, Our First Space Station**

*L. F. Belew*

Skylab's role in the study of solar and stellar astronomy, data on solar physics and space processing experiments.

NASA SP-400  
N77-27155 176 pp  
Avail GPO 1977

### **Skylab, Classroom in Space**

*L. B. Summerlin*

Student-designed Skylab experiments and demonstrations on the effect of weightlessness.

NASA SP-401  
N77-29189 190 pp  
Avail GPO 1977

### **A New Sun: The Solar Results From Skylab**

*J. A. Eddy*

The Sun as seen by Skylab's cameras.

NASA SP-402  
N79-22991 220 pp  
Avail GPO 1979

### **Volcanic Features of Hawaii. A Basis for Comparison With Mars**

*M. H. Carr, R. Greeley*

Similarities and differences between the volcanoes of Hawaii and those on Mars. Photographs.

NASA SP-403  
N80-23912 216 pp  
Avail GPO 1980

### **Skylab's Astronomy and Space Sciences**

*C. A. Lundquist*

Skylab's multidisciplinary capabilities, including observations of stars and galaxies, energetic particles, interplanetary dust, Comet Kohoutek.

NASA SP-404  
N79-34118 126 pp  
Avail GPO 1979

### **Vortex-Lattice Utilization**

Implementation and application of the vortex-lattice method to aerodynamic design and analysis. Workshop, May 1976.

NASA SP-405  
N76-28163 409 pp  
Avail NTIS 1976

### **Powered-Lift Aerodynamics and Acoustics**

Conference on high-lift aerodynamics, high-speed and cruise aerodynamics, acoustics, propulsion aerodynamics and acoustics, aerodynamic and acoustic loads, and full-scale and flight research. May 1976.

NASA SP-406  
N78-24016 502 pp  
Avail NTIS 1976

### **Space Shuttle**

Flight system, mission profile, economic and social benefits, description of vehicle.

NASA SP-407  
N76-31268 97 pp  
Avail GPO 1976

### **Viking 1: Early Results**

Text and photos from the first weeks after the Viking 1 landing on Mars.

NASA SP-408  
N76-28296 76 pp  
Avail NTIS 1976



### Wake Vortex Minimization

Research on the effect of wing span, wing flaps, spoilers, splines, and engine thrust on vortex attenuation. Symposium, February 1976.

NASA SP-409  
N78-12017 403 pp  
Avail NTIS 1977

### Satellite-Derived Global Oceanic Rainfall Atlas

*M. S. V. Rao, W. V. Abbott III,  
J. S. Theon*

NASA SP-410  
N77-19709 336 pp  
Avail GPO 1976

### The Apollo-Soyuz Test Project Medical Report

*A. E. Nicogossian*

Clinical aspects and preflight and postflight research studies performed on the astronauts.

NASA SP-411  
N77-30735 129 pp  
Avail NTIS 1977

### Apollo-Soyuz Test Project Summary Science Report

Volume I. Astronomy, Earth Atmosphere and Gravity Field, Life Sciences, and Materials Processing

NASA SP-412  
N78-17088 570 pp  
Avail NTIS 1977

Volume II. Earth Observations and Photography

*F. El-Baz, D. M. Warner*

NASA SP-412  
N80-10538 700 pp  
Avail NTIS 1979

### Settlements in Space: A Design Study

*R. D. Johnson, C. Holbrow*

Concept of how people might permanently sustain life in space on a large scale; design of a system to colonize space.

NASA SP-413  
N77-21106 191 pp  
Avail GPO 1977

### On the Habitability of Mars: An Approach to Planetary Ecosynthesis

*M. M. Avern, R. D. Macelroy*

Examination of the possibility of utilizing Mars as a habitat for terrestrial life.

NASA SP-414  
N77-12718 114 pp  
Avail NTIS 1976

### Flutter Testing Techniques

Developments in methodology and data analysis techniques for flutter testing in flight and on the ground

NASA SP-415  
N77-21022 483 pp  
Avail NTIS 1976

### Aircraft Safety and Operating Problems

Terminal area operations, flight dynamics and control, ground operations, atmospheric environment, structures and materials, power plants, noise, human factors engineering. Conference, October 1976.

NASA SP-416  
N77-18081 644 pp  
Avail NTIS 1976

### A Geological Basis for the Exploration of the Planets

*R. Greeley, M. H. Carr*

Relevance of planetary geology in relation to the origin and evaluation of the solar system and life. Stratigraphy, structural geology, and geochemistry of planets.

NASA SP-417  
N77-15961 117 pp  
Avail NTIS 1976

### Lunar Sample Studies

Technical examination of breccias, basalts, and anorthosites.

NASA SP-418  
N77-27053 72 pp  
Avail NTIS 1977

### The Search for Extraterrestrial Intelligence: SETI

*P. Morrison, J. Billingham, J. Wolfe*

Cosmic evolution, space communication, technological advances, search strategies and systems. Includes bibliography of reports concerning the search for extraterrestrial intelligence.

NASA SP-419  
N78-18771 289 pp  
Avail GPO 1977

### Voyager to Jupiter and Saturn

Voyager mission schedule and profiles for encounters, description of spacecraft and trajectories, scientific investigations and instruments.

NASA SP-420  
N77-29046 62 pp  
Avail NTIS 1977

### Recognition of Compact Astrophysical Objects

*H. Ogelman, R. Rothschild*

Stellar evolution, pulsars, binary stars, x-ray signatures, gamma ray sources, temporal analysis of x-ray data.

NASA SP-421  
N77-34063 200 pp  
Avail NTIS 1977

### Calculation Methods for Compressible Turbulent Boundary Layers: State-of-the-Art, 1976

*D. M. Bushnell, A. M. Cary, Jr., J. E. Harris*

Equations and closure methods for compressible turbulent boundary layers, flow phenomena, three-dimensional layers.

NASA SP-422  
N78-13371 146 pp  
Avail NTIS 1977

### Atlas of Mercury

*M. E. Davies, S. E. Dornik, D. E. Gault, R. G. Strom*

Mariner 10 spacecraft, scientific mission, surface mapping techniques, topographic features of Mercury. Photographs, shaded relief maps, photomosaics.

NASA SP-423  
N78-30025 135 pp  
Avail GPO 1978

### The Voyage of Mariner 10: Mission to Venus and Mercury

*J. A. Dunne, E. Burgess*

Historical details of Mariner 10 mission, images of Venus and Mercury.

NASA SP-424  
N78-27146 233 pp  
Avail GPO 1978

### The Martian Landscape

Design of the facsimile camera, image sequencing, picture calibration, reconstruction of color, search for motion on Mars. Over 200 color and black and white photographs. Stereo pairs and stereopticon included.

NASA SP-425  
N79-12984 160 pp  
Avail GPO 1978

### Sun, Weather, and Climate

*J. R. Herman, R. A. Goldberg*

Solar-related correlation factors, long-term climatic trends, short-term meteorological correlations, obscuring influences, physical processes and mechanisms, recapitulation of Sun-weather relationships, guidelines for experiments.

NASA SP-426  
N79-20961 365 pp  
Avail GPO 1978

### High-Altitude Perspective

Capabilities of the NASA Ames Research Center U-2 aircraft for research or experimental programs.

NASA SP-427  
N78-31508 33 pp  
Avail GPO 1978

### Space Resources and Space Settlements

*J. Billingham, W. P. Gilbreath, B. Oleary, et al.*

Research needs for regenerative life-support systems, habitat design, dynamics and design of electromagnetic mass drivers, asteroids as resources for space manufacturing, processing of nonterrestrial materials.

NASA SP-428  
N79-32225 292 pp  
Avail GPO 1979

### Physiological Responses of Women to Simulated Weightlessness

*H. Sandler, D. L. Winter*

Subjects were exposed to centrifugation, lower body negative pressure, and exercise stress.

NASA SP-430  
N79-13686 92 pp  
Avail NTIS 1978

### The Space Shuttle at Work

*H. Allaway*

Operation, tasks and duties, design, future development of the Space Shuttle.

NASA SP-432  
N80-30367 84 pp  
Avail GPO 1979

**Shuttle Atmospheric Lidar Research  
Program: Final Report of Science  
Working Group**

Determination of global flow of water vapor and pollutants in the troposphere, improvement of chemical and transport models of the stratosphere and mesosphere, evaluation of radiative models of the atmosphere, investigation of chemistry and transport of thermospheric atomic species and magnetospheric aspects of Sun/weather relationships.

NASA SP-433  
N80-11414 231 pp  
Avail NTIS 1979

**An Emission-Line Survey of the Milky  
Way**

*R. A. R. Parker, T. R. Gull,  
R. P. Kirschner*

The instrumentation used in an examination of the ionization structure of emission nebulae and of the galactic plane in general, and characteristics of the prints obtained.

NASA SP-434  
N80-11966 224 pp  
Avail GPO 1979

**Terminal Configured Vehicle Program  
Facilities Guide**

Program established to conduct research and to develop and evaluate aircraft and flight management system technology concepts to benefit conventional takeoff and landing operations in the terminal area. Analyses, simulation and flight experiments.

NASA SP-435  
N80-18028 67 pp  
Avail NTIS 1980

**Project Orion: A Design Study of a  
System for Detecting Extrasolar Planets**

*D. C. Black*

Design concept for a ground-based astrometric telescope that could significantly increase the potential accuracy of astrometric observations.

NASA SP-436  
N80-27260 214 pp  
Avail GPO 1980

**Mathematical Modeling of Diverse  
Phenomena**

*J. C. Howard*

Tensor calculus applied to the formulation of mathematical models of diverse phenomena.

NASA SP-437  
N80-13839 402 pp  
Avail NTIS 1979

**Atlas of Mars**

*R. M. Batson, P. M. Bridges, J. L. Inge*

Small-scale maps and photomosaics covering the entire surface of the planet Mars.

NASA SP-438  
N80-16998 154 pp  
Avail GPO 1979

**Voyage to Jupiter**

*D. Morrison, J. Samz*

The story of the Voyager project, including many color photographs from the Voyager 1 and 2 flybys of Jupiter.

NASA SP-439  
N81-10910 211 pp  
Avail GPO 1980

**Viking Orbiter Views of Mars**

*C. R. Spitzer*

A collection of Viking Orbiter images, including polar regions, moons, atmosphere, craters, and channels. Stereopticon included.

NASA SP-441  
N81-11966 189 pp  
Avail GPO 1980

**Lessons of the NASA Tech House**

*H. Allaway*

Report of a family's one-year residence in Langley Research Center's experimental house of the future that combines advanced electronics, solar energy, water recycling, and fire-retardant materials.

NASA SP-442  
N80-27219 41 pp  
Avail GPO 1980

**Images of Mars: The Viking Extended  
Mission**

*M. H. Carr, N. Evans*

Thirty black and white photographs of Mars, some taken as recently as 1979, showing volcanoes, lava plains, channels, canyons, plateaus, impact craters, surface features of Phobos and Deimos.

NASA SP-444  
N80-26239 35 pp  
Avail GPO 1980

**Pioneer: First to Jupiter, Saturn, and  
Beyond**

*R. C. Fimmel, J. A. Van Allen,  
E. Burgess*

The missions of Pioneers 10 and 11 to Jupiter and Saturn and toward the outermost limits of the solar system. Descriptions of the spacecraft, the scientific payload, the mission and details of all scientific results. (Supersedes NASA SP-349)

NASA SP-446  
N81-15925 293 pp  
Avail GPO 1980

## Handbooks and Data Compilations

### Thermodynamic Properties to 6000 K for 210 Substances Involving the First 18 Elements

*J. G. Eblers, S. Gordon,  
S. Heibel, et al.*

NASA SP-3001  
N63-23715 332 pp  
Avail NTIS 1963

### Thermodynamic Properties and Mollier Chart for Hydrogen From 300 K to 20 000 K

*R. F. Kubin, L. L. Presley*

NASA SP-3002  
N64-18507 69 pp  
Avail NTIS 1964

### Handbook of Space-Radiation Effects on Solar-Cell Power Systems

*W. C. Cooley, R. J. Janda*

NASA SP-3003  
N63-20315 120 pp  
Avail NTIS 1963

### Tables for Supersonic Flow Around Right Circular Cones at Zero Angle of Attack

*J. L. Sims*

NASA SP-3004  
N64-18949 428 pp  
Avail GPO 1964

### Tables of the Composition, Opacity, and Thermodynamic Properties of Hydrogen at High Temperatures

*N. L. Krascella*

NASA SP-3005  
N65-14300 190 pp  
Avail NTIS 1963

### Bioastronautics Data Book

*J. F. Parker, Jr., V. R. West*

Bioastronautics research, including stress effects, sensory perception, and human performance.

NASA SP-3006  
N73-15091 938 pp  
Avail GPO 1973

### Tables for Supersonic Flow Around Right Circular Cones at Small Angle of Attack

*J. L. Sims*

NASA SP-3007  
N64-25017 427 pp  
Avail GPO 1964

### Energy Spectra and Angular Distribu- tions of Electrons Transmitted Through Sapphire (Aluminum Oxide) Foils

*M. J. Berger, S. M. Seltzer*

NASA SP-3008  
N64-18416 109 pp  
Avail NTIS 1964

### Tables of Flow Properties of Thermally Perfect Carbon Dioxide and Nitrogen Mixtures

*W. P. Peterson*

NASA SP-3009  
N64-19997 119 pp  
Avail NTIS 1964

### Tables of the Complex Fresnel Integral

*C. W. Martz*

Fresnel integral evaluated by Taylor series expansions.

NASA SP-3010  
N64-23531 298 pp  
Avail NTIS 1964

### Thermodynamic and Transport Proper- ties for the Hydrogen-Oxygen System

*R. A. Svehla*

NASA SP-3011  
N64-26785 423 pp  
Avail NTIS 1964

### Tables of Energy Losses and Ranges of Electrons and Positrons

*M. J. Berger, S. M. Seltzer*

NASA SP-3012  
N65-12506 131 pp  
Avail NTIS 1964

### Tables of Energy Losses and Ranges of Heavy Charged Particles

*W. H. Barkas, M. J. Berger*

NASA SP-3013  
N65-12507 132 pp  
Avail NTIS 1964

### Equilibrium Thermodynamic Properties of Carbon Dioxide

*H. E. Bailey*

NASA SP-3014  
N65-20478 69 pp  
Avail NTIS 1965

**Charts for Equilibrium Flow Properties of Carbon Dioxide in Hypervelocity Nozzles**

*L. H. Jorgensen, R. J. Redmond*

NASA SP-3015  
N65-20479 74 pp  
Avail NTIS 1965

**Venus and Mars Nominal Natural Environment for Advanced Manned Planetary Mission Programs**

*D. E. Evans, G. L. Kraus, D. E. Pitts*

NASA SP-3016  
N67-25042 59 pp  
Avail NTIS 1967

**Charts for Approximate Thermodynamic Properties of Nitrogen-Oxygen Mixtures**

*R. D. Brown, B. Fowler*

Charts for equilibrium thermodynamic properties of nitrogen-oxygen mixtures under extreme pressure and temperature ranges.

NASA SP-3017  
N65-26639 116 pp  
Avail NTIS 1965

**Charts for Equilibrium and Frozen Flows Across Plane Shock Waves in Carbon Dioxide**

*V. L. Peterson, C. D. Simcox*

Charts for equilibrium and frozen flow across plane shock waves in carbon dioxide used in estimating aerodynamic performance characteristics of bodies in flight.

NASA SP-3018  
N65-28627 128 pp  
Avail NTIS 1965

**Charts for Equilibrium and Frozen Nozzle Flows of Carbon Dioxide**

*G. G. Mateer, V. L. Peterson*

NASA SP-3019  
N65-29951 80 pp  
Avail NTIS 1965

**Charts of Isentropic Exponent as a Function of Enthalpy for Various Gases in Equilibrium**

*L. H. Jorgensen*

Charts of isentropic exponent as function of enthalpy and speed for air, nitrogen, carbon dioxide, and mixtures of nitrogen and carbon dioxide in equilibrium.

NASA SP-3020  
N65-34243 13 pp  
Avail NTIS 1965

**Equilibrium Thermodynamic Properties of Three Engineering Models of the Martian Atmosphere**

*H. E. Bailey*

Equilibrium thermodynamic properties (entropy, enthalpy, pressure, and sound speed) of three engineering models of Martian atmosphere.

NASA SP-3021  
N65-35792 164 pp  
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**Magnetic Fields Due to Solid and Hollow Conical Conductors**

*J. C. Laurence, J. C. Stoll, P. L. Yohner*

Technology of high field electromagnets, axial and radial components of magnetic field produced by solid conical conductor with constant azimuthal current density.

NASA SP-3022  
N66-13046 133 pp  
Avail NTIS 1965

**Calculations of Thermal Field Emission for a Terminated Image Potential**

*J. F. Morris*

NASA SP-3023  
N66-16421 612 pp  
Avail NTIS 1966

**Models of the Trapped Radiation Environment. Volume I: Inner Zone Protons and Electrons**

*J. I. Vette*

Models of inner radiation belt to determine values of fluxes and energy spectra of protons and electrons trapped in geomagnetic field.

NASA SP-3024  
N66-16054 59 pp  
Avail NTIS 1966

**Models of the Trapped Radiation Environment. Volume II: Inner and Outer Zone Electrons**

*A. B. Lucero, J. I. Vette, J. A. Wright*

Trapped electron environment in inner and outer radiation belts: tables and graphs.

NASA SP-3024  
N66-35685 100 pp  
Avail NTIS 1966

**Models of the Trapped Electron Radiation Environment. Volume III: Electrons at Synchronous Altitudes**

*A. B. Lucero, J. I. Vette, J. A. Wright*

NASA SP-3024  
N67-19899 111 pp  
Avail NTIS 1967

**Models of the Trapped Radiation Environment. Volume IV: Low Energy Protons**

*J. H. King*

NASA SP-3024  
N67-36447 66 pp  
Avail NTIS 1967

**Models of the Trapped Radiation Environment. Volume V: Inner Belt Protons**

*J. P. Lavine, J. I. Vette*

Model environment of inner belt proton fluxes.

NASA SP-3024  
N69-28911 61 pp  
Avail NTIS 1969

**Models of the Trapped Radiation Environment. Volume VI: High Energy Protons**

*J. P. Lavine, J. I. Vette*

Model environment of high energy protons trapped in radiation belts.

NASA SP-3024  
N71-12117 49 pp  
Avail NTIS 1970

**Models of the Trapped Radiation Environment. Volume VII: Long Term Time Variations**

Time variations of energetic electron and solar proton distributions in inner radiation belt.

NASA SP-3024  
N71-29089 62 pp  
Avail NTIS 1971

**Space Materials Handbook: Supplement 1 to the Second Edition, Space Materials Experience**

*J. B. Rittenhouse, J. B. Singletary*

Spacecraft structures and systems materials handbook.

NASA SP-3025  
N66-18439 276 pp  
Avail NTIS 1966

**Electron Densities and Scale Heights in the Topside Ionosphere: Alouette I Observations in Midlatitudes**

*L. Colin, M. J. Rycroft, J. O. Thomas*

NASA SP-3026  
N66-27056 658 pp  
Avail NTIS 1966

**Electron Densities and Scale Heights in the Topside Ionosphere: Alouette I Observations Over the American Continents. Volume I: November, December 1962, and January 1963**

*K. L. Chan, L. Colin, J. O. Thomas*

NASA SP-3027  
N66-33197 508 pp  
Avail NTIS 1966

**Space Measurement Survey: Instruments and Spacecraft, October 1957-March 1965**

*H. L. Richter, Jr., H. L. Richter*

List of satellites and space probes with descriptions of scientific instrumentation.

NASA SP-3028  
N66-33075 1013 pp  
Avail NTIS 1966

**Handbook of the Physical Properties of the Planet Venus**

*H. A. Hyatt, L. R. Koenig, C. M. Michaux, et al.*

Handbook of physical properties, theories, and scientific observations for planet Venus.

NASA SP-3029  
N67-31439 124 pp  
Avail NTIS 1967

**Handbook of the Physical Properties of the Planet Mars**

*C. M. Michaux*

NASA SP-3030  
N67-35182 173 pp  
Avail NTIS 1967

**Handbook of the Physical Properties of the Planet Jupiter**

*C. M. Michaux*

NASA SP-3031  
N67-26559 140 pp  
Avail GPO 1967

**Electron Densities and Scale Heights in the Topside Ionosphere: Alouette I Observations Over the American Continents. Volume II: March and May 1963**

*K. L. Chan, L. Colin, J. O. Thomas*

NASA SP-3032  
N66-38867 610 pp  
Avail NTIS 1966

**Electron Densities and Scale Heights in the Topside Ionosphere: Alouette I Observations Over the American Continents. Volume III: June, July, September, and October 1963**

*K. L. Chan, L. Colin, J. O. Thomas*

NASA SP-3033  
N67-14933 585 pp  
Avail NTIS 1966

**Electron Densities and Scale Heights in the Topside Ionosphere: Alouette I Observations Over the American Continents. Volume IV: Summary Graphs**

*K. L. Chan, L. Colin, J. O. Thomas*

NASA SP-3034  
N67-36446 324 pp  
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**Thermodynamic, Transport, and Flow Properties for the Products of Methane Burned in Oxygen-Enriched Air**

*B. H. Croom, E. W. Leybe*

NASA SP-3035  
N66-37802 91 pp  
Avail NTIS 1966

**Additional Stopping Power and Range Tables for Protons, Mesons, and Electrons**

*M. J. Berger, S. M. Seltzer*

Stopping power and range tables for protons, mesons, and electrons in lithium fluoride, silicon, germanium, liquid hydrogen, propane, and freon.

NASA SP-3036  
N67-14099 40 pp  
Avail NTIS 1966

**Handling and Use of Fluorine and Fluorine-Oxygen Mixtures in Rocket Systems**

*J. T. Harper, H. W. Schmidt*

NASA SP-3037  
N67-26000 285 pp  
Avail NTIS 1967

**Electron Densities and Scale Heights in the Topside Ionosphere: Alouette I Observations Recorded in Hawaii: Winter 1962-1963, Summer 1963**

*K. L. Chan, L. Colin*

Tabulations and graphs of electron density and plasma scale height data computed from Alouette I topside sounder ionograms.

NASA SP-3038  
N67-18948 286 pp  
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**Tables of Interference Factors for Use in Correcting Data From VTOL Models in Wind Tunnels With 7 by 10 Proportions**

*H. H. Heyson*

NASA SP-3039  
N67-22897 653 pp  
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**Thermodynamic Equilibrium in Prebiological Atmospheres of C, H, O, N, P, S, and Cl**

*M. O. Dayhoff, R. V. Eck, E. R. Lippincott, et al.*

Thermodynamic equilibrium in prebiological atmospheres, and inorganic origin of organic compounds.

NASA SP-3040  
N67-27295 274 pp  
Avail NTIS 1967

**Tables of Fe I Line Intensities.**

**Volume 1: Temperature From 1000 to 6500 K.**

**Volume 2: Temperatures Between 6500 and 20 000 K**

*W. J. Borucki*

Atomic line intensity tables for ionized iron atom at high temperatures.

NASA SP-3041  
N68-24161 219 pp  
Avail NTIS 1968

**Tabulated Communication Characteristics of a Steady-State Model of Interplanetary Space**

*J. Dimeff, R. J. Hruby, A. H. Simes, et al.*

NASA SP-3042  
N68-10164 526 pp  
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**Properties of Magnetic Materials for Use in High-Temperature Space Power Systems**

*J. J. Clark, P. E. Kueser, D. H. Lane, et al.*

Property data of magnetic materials for use in high temperature liquid alkali-metal space power systems.

NASA SP-3043  
N68-17624 325 pp  
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**A Numerical Least-Square Method for Resolving Complex Pulse Height Spectra**

*R. L. Schmadebeck, J. I. Trombka*

NASA SP-3044  
N68-29520 175 pp  
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### Compressed Gas Handbook

*R. A. Cota, J. S. Kunkle,  
S. D. Wilson*

High pressure compressible flow systems in space vehicle ground support equipment.

NASA SP-3045

N69-26987 572 pp

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### Real-Gas Effects in Critical Flow Through Nozzles and Thermodynamic Properties of Nitrogen and Helium at Pressures to $300 \times 10^5$ Newtons Per Square Meter

*R. C. Johnson*

FORTTRAN 4 subroutines for calculating critical flow factor to determine mass flow rate of gaseous helium and nitrogen through critical flow nozzles.

NASA SP-3046

N69-16098 204 pp

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### Two-Micron Sky Survey: A Preliminary Catalog

*R. B. Leighton, G. Neugebauer*

Two-micron sky survey catalog of celestial objects.

NASA SP-3047

N69-37993 316 pp

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### Charts for Interpolation of Local Skin Friction From Experimental Turbulent Velocity Profiles

*J. M. Allen, D. H. Tudor*

Graphical interpolation charts of local skin friction from compressible velocity profiles.

NASA SP-3048

N69-25391 42 pp

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### Computer-Aided Filter Design Manual

*S. Gussow, G. Weathers*

Computerized telemetry filter design.

NASA SP-3049

N69-35816 106 pp

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### Tabulations of Configuration Factors Between Any Two Spheres and Their Parts

*N. T. Grier*

Tabulated values of configuration factors between two spheres and parts of two spheres.

NASA SP-3050

N69-37777 424 pp

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### Space Materials Handbook

*J. B. Rittenhouse, J. B. Singletary*

Aerospace environment and effects on materials, spacecraft material selection, and biological interaction with spacecraft materials. Third edition.

NASA SP-3051

N70-21226 760 pp

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### Semiclassical Elastic Scattering Cross Sections for a Central Field Potential Function

*J. R. Stallcop*

NASA SP-3052

N70-14494 299 pp

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### Relative Geometries of the Earth, Sun, and Mars From the Year 1973 to the Year 2000

*S. W. Souders*

NASA SP-3053

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*E. G. Stassinopoulos*

NASA SP-3054

N70-28118 362 pp

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*J. Ramasastry, E. J. Walsh*

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### Average Energies of Ground and Singly and Doubly Excited Configurations in Highly Ionized Atoms (Electron Numbers $N = 3$ to $N = 20$ )

*S. O. Kastner, Y. Shadmi*

NASA SP-3056

N71-20535 258 pp

Avail NTIS 1971

### Lunar Ephemeris and Selenographic Coordinates of the Earth and Sun for 1971 and 1972

*A. D. Hartung*

Lunar ephemeris and selenographic coordinates of Earth and Sun for 1971 and 1972, related geometric information, tables and graphs.

NASA SP-3057

N72-23896 437 pp

Avail NTIS 1972



**Lunar Ephemeris and Selenographic Coordinates of the Earth and Sun for 1973 and 1974**

*A. D. Hartung*

NASA SP-3058  
N72-23897 442 pp  
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**Lunar Ephemeris and Selenographic Coordinates of the Earth and Sun for 1975 and 1976**

*A. D. Hartung*

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N72-26730 441 pp  
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**Lunar Ephemeris and Selenographic Coordinates of the Earth and Sun for 1977 and 1978**

*A. D. Hartung*

NASA SP-3060  
N72-30820 442 pp  
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**Lunar Ephemeris and Selenographic Coordinates of the Earth and Sun for 1979 and 1980**

*A. D. Hartung*

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N72-30819 442 pp  
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**Lunar Ephemeris and Selenographic Coordinates of the Earth and Sun for 1981 and 1982**

*A. D. Hartung*

NASA SP-3062  
N72-30828 441 pp  
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**Lunar Ephemeris and Selenographic Coordinates of the Earth and Sun for 1983 and 1984**

*A. D. Hartung*

NASA SP-3063  
N72-31864 437 pp  
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**Compilation of Ultraviolet Photoabsorption Cross Sections for Atoms Between 5 and 3500 Å**

*R. D. Hudson, L. J. Kieffer*

Photoabsorption cross section data as function of wavelength for 24 atoms.

NASA SP-3064  
N71-26087 61 pp  
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**Hydrogen Line Blanketed Model Stellar Atmospheres**

*D. A. Klinglesmith*

NASA SP-3065  
N71-20410 264 pp  
Avail NTIS 1971

**Partition Functions and Equations of State in Plasmas**

*D. Fischel, W. M. Sparks*

NASA SP-3066  
N71-28173 617 pp  
Avail NTIS 1971

**Radio Frequency Interference Handbook**

*R. E. Taylor*

STADAN radio frequency interference problems involving electromagnetic compatibility and lightning.

NASA SP-3067  
N72-11153 273 pp  
Avail NTIS 1971

**Atomic Emission Line Wavelength Calculations below 2000 Angstroms for Lithium II Through Cobalt XXVI**

*M. D. Williams*

NASA SP-3068  
N72-12684 118 pp  
Avail NTIS 1971

**Thermodynamic Properties and Theoretical Rocket Performance of Hydrogen to 100 000 K and  $1.01325 \times 10^8 \text{ N/m}^2$**

*R. W. Patch*

Thermodynamic properties and theoretical rocket performance of hydrogen to 100 000 K and  $1.01325 \times 10^8 \text{ N/m}^2$  for chemical equilibrium in Debye-Huckel and ideal gas approximations.

NASA SP-3069  
N72-12776 114 pp  
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**Summary of Transformation Equations and Equations of Motion Used in Free Flight and Wind Tunnel Data Reduction and Analysis**

*T. G. Gainer, S. Hoffman*

Basic formulations for developing coordinate transformations and equations of motion used with free flight and wind tunnel data reduction.

NASA SP-3070  
N72-26475 127 pp  
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**ASRDI Oxygen Technology Survey.  
Volume I: Thermophysical Properties**

*H. M. Roder, L. A. Weber*

Handbook of thermophysical properties of liquid and gaseous oxygen.

NASA SP-3071  
N73-13952 432 pp  
Avail NTIS 1972

**ASRDI Oxygen Technology Survey.  
Volume II: Cleaning Requirements,  
Procedures, and Verification  
Techniques**

*H. Bankaitis, C. F. Schueller*

Cleaning processes and postcleaning inspection procedures for meeting oxygen system cleaning requirements.

NASA SP-3072  
N73-15155 80 pp  
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**ASRDI Oxygen Technology Survey.  
Volume IV: Low Temperature  
Measurement**

*L. L. Sparks*

NASA SP-3073  
N74-27190 167 pp  
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**Tables of Critical-Flow Functions and  
Thermodynamic Properties for Methane  
and Computational Procedures for Both  
Methane and Natural Gas**

*R. C. Johnson*

Calculation of mass flow rate of methane and natural gas through nozzles.

NASA SP-3074  
N73-15309 73 pp  
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Possible Daily Release Window for Sky  
Target Experiments**

*N. H. Michaud*

NASA SP-3075  
N74-11985 151 pp  
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**ASRDI Oxygen Technology Survey.  
Volume III: Heat Transfer and Fluid  
Dynamics-Abstracts of Selected  
Technical Reports and Publications**

*A. F. Schmidt*

Abstracts of selected reports on heat transfer and fluid dynamics with applicability to oxygen systems.

NASA SP-3076  
N73-16932 177 pp  
Avail NTIS 1972

**ASRDI Oxygen Technology Survey.  
Volume VII: Characteristics of Metals  
That Influence System Safety**

*J. J. Pelouch, Jr.*

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N74-23117 74 pp  
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**Tables for Supersonic Flow of Helium  
Around Right Circular Cones at Zero  
Angle of Attack**

*J. L. Sims*

Analysis of characteristics of supersonic flow of helium around right circular cones at zero angle of attack and Mach numbers from 1.5 to 30.0.

NASA SP-3078  
N73-27208 28 pp  
Avail GPO 1973

**Nondestructive Evaluation Technique  
Guide**

*A. Vary*

Seventy nondestructive evaluation techniques, a description of each technique, physical principles involved, example applications, limitations, schematic illustrations.

NASA SP-3079  
N73-31441 110 pp  
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**Handbook of Infrared Radiation From  
Combustion Gases**

*C. B. Ludwig, W. Malkimus,  
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Handbook on radiant emission and absorption of combustion gases for application to design of rocket combustion chambers and exhausts, turbojet engines, and industrial furnaces.

NASA SP-3080  
N73-27807 497 pp  
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**Auroral Bremsstrahlung at Balloon  
Altitudes**

*S. M. Seltzer, M. J. Berger,  
T. Rosenberg*

Auroral bremsstrahlung flux spectra at various atmospheric depths.

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N73-32293 28 pp  
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**Revised Tables of Airspeed, Altitude,  
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International System of Units**

*M. S. Benner, R. H. Sawyer*

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Volume V: Density and Liquid Level  
Measurement Instrumentation for the  
Cryogenic Fluids Oxygen, Hydrogen,  
and Nitrogen**

*H. M. Roder*

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Instrumentation**

*D. B. Mann*

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**Tables and Charts of Equilibrium Normal  
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for Helium-Hydrogen Mixtures With  
Velocities to 70 km/sec**

*C. G. Miller III, S. E. Wilder*

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**Near-Infrared Spectra of Jupiter,  
Saturn, and Uranus**

*A. E. Potter*

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N74-33269 252 pp  
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70 km/sec**

*C. G. Miller III, S. E. Wilder*

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**Thermodynamic and Related Properties  
of Parahydrogen From the Triple Point  
to 300 K at Pressures to 1000 Bar**

*A. L. Weber*

NASA SP-3088  
N75-22407 105 pp  
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physical Properties**

*R. D. McCarty*

Thermodynamic functions, transport properties, and physical properties of liquid and gaseous hydrogen.

NASA SP-3089  
N76-11297 535 pp  
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*H. W. Schmidt, D. E. Forney*

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0.4-Millibar Surfaces for January 1972  
Through June 1973**

Data from meteorological rocketsonde and satellite radiance measurements used to analyze high-altitude synoptic charts.

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*J. M. Arridson, J. A. Brennan*

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at Angles of Attack, Sweep, and  
Dihedral**

*J. L. Hunt, S. W. Souder*

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**Spacecraft Materials Guide**

*C. L. Staugaitis*

Low density and syntactic foams, electrical encapsulants, optical glasses, interference filters, lamellar lubricants, soldering and brazing processes.

NASA SP-3094  
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March 19-20, 1974**

*F. J. Schmidlin, Y. Yamasaki,  
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Gases: A Handbook for Engineers**

*C. F. Hansen*

NASA SP-3096  
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*C. G. Miller III, S. E. Wilder*

NASA SP-3097  
N76-32272 493 pp  
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**Tables and Charts of Equilibrium Normal Shock and Shock Tube Properties for Pure Argon With Velocities to 18 km/sec**

*C. G. Miller III, S. E. Wilder*

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N76-29536 302 pp  
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*A. L. Simmonds, C. G. Miller III,  
J. E. Nealy*

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N76-30097 259 pp  
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*C. G. Miller III, S. E. Wilder*

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N77-16292 318 pp  
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Abstracted Publications**

*F. R. Williamson, N. A. Olien*

Abstracts containing experimental data on the properties of adhesive and sealants at cryogenic temperatures.

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Satellite radiance measurements and data from meteorological rocketsondes used to analyze high-altitude constant pressure charts.

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## Histories and Chronologies

### **Project Mercury: A Chronology**

*J. M. Grimwood*

Events leading to the project, test objectives, flight data summary, launch site summary.

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P. J. Vorzimer*

Chronological study of design and development of Gemini project.

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*M. M. Link*

Medical aspects of Project Mercury including astronaut selection and training, results of laboratory tests and physiological data, and biomedical planning for space flights.

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### **Astronautics and Aeronautics, 1963: Chronology on Science, Technology, and Policy**

Chronological compilation of events relating to space exploration and exploitation.

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*E. M. Emme*

Space probes and manned space flights.

NASA SP-4005  
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### **Astronautics and Aeronautics, 1965: Chronology on Science, Technology and Policy**

NASA SP-4006  
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NASA SP-4007  
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Volume I. Through November 7, 1962.

*I. D. Ertel, M. L. Morse*

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*M. L. Morse, J. K. Bays*

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*C. G. Brooks, I. D. Ertel*

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N76-21268 296 pp  
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*I. D. Ertel, R. W. Newkirk,  
C. G. Brooks*

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### **Astronautics and Aeronautics, 1968: Chronology on Science, Technology, and Policy**

Chronology on aerospace events and personalities.

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N70-27240 437 pp  
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**Skylab: A Chronology**

*R. W. Newkirk, I. D. Ertel,  
C. G. Brooks*

Early space station activities, Apollo applications, and Skylab development and operations. Includes appendix on experiments conducted on Skylab.

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**NASA Historical Data Book, 1958-1968.  
Volume I: NASA Resources**

*J. Vannimmen, L. C. Bruno,  
R. L. Rosholt*

Presents a data base on the tangible aspects of NASA and its programs. Organization and management.

NASA SP-4012  
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*N. L. Brun, E. H. Ritchie*

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1958-1963**

*R. L. Rosholt*

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*C. C. Alexander, J. M. Grimwood,  
L. S. Swenson, Jr.*

Technological and managerial history of Mercury project, including bibliography.

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N67-14934 694 pp  
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**Vanguard: A History**

*M. C. Green, M. Lomask*

Origin, course of development, and results of Vanguard Project.

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of Project Gemini**

*B. C. Hacker*

Gemini, the intermediate manned space flight program between the Mercury and Apollo programs, was an important prerequisite to the lunar expeditions.

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Development of the Apollo launch facilities and operations from the beginning of the design through the final launch.

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*C. G. Brooks, J. M. Grimwood,  
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Review of the Apollo lunar exploration program with a focus on the spacecraft, including command and service modules and the lunar module.

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*E. C. Ezell, L. N. Ezell*

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*R. C. Hall*

Basic management techniques, flight operating procedures, and technology for NASA's unmanned lunar missions.

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*A. Rosenthal*

History of NASA Goddard Space Flight Center through 1963.

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N68-30317 369 pp  
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### **Adventures in Research: A History of Ames Research Center, 1940-1965**

*E. P. Hartman*

Historical survey of aeronautical research and development at Ames Research Center from 1936 to 1965.

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N70-41479 673 pp  
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*W. R. Corliss*

Historical summary of the development and use of sounding rockets.

NASA SP-4401  
N72-12873 162 pp  
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### **Origins of NASA Names**

*H. T. Wells, S. H. Whiteley,  
C. E. Karegeannes*

Selection of names for launch vehicles, spacecraft, manned spaceflight programs, sounding rockets, and field installations through 1974.

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*J. L. Sloop*

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*E. H. Kroman*

Analysis of management procedures applied to Surveyor and Lunar Orbiter projects.

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### **The Planetary Quarantine Program: Origins and Achievements, 1956-1973**

*C. R. Phillips*

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*L. B. Vale*

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Techniques and materials for soldering electrical connections.

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*H. M. Nance*

Aluminum sheet plate welding tools and techniques.

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Three sealed battery systems—nickel-cadmium, silver-cadmium, and silver-zinc—for spacecraft power use.

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Voice communications system using light beams.

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*V. L. Rogallo*

Heartbeat measurement of bird embryos with micrometeorite transducer as ballistocardiograph.

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Aluminum welding techniques for space vehicle applications.

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Technology handbook for machinists, mechanics, and technicians—shock absorbers and protective devices, machining, metal forming, welding and brazing, and precision tools.

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### Welding for Electronic Assemblies

Resistance spot-welding of interconnecting electronic components.

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### Effects of Low Temperatures on Structural Metals

*A. G. Imgram, W. S. Lyman,  
H. L. Martin*

Cryogenic temperature investigations of aluminum, nickel, steel, titanium, and magnesium alloys.

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N65-11046 60 pp  
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### Effects of Low Temperatures on the Mechanical Properties of Structural Metals

*J. E. Campbell, A. G. Imgram,  
H. L. Martin, et al.*

Low temperature effects on tensile properties of aluminum, magnesium, nickel, steel, and titanium alloys.

NASA SP-5012(01)  
N68-31605 65 pp  
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Precision tools, machine tools, and measuring apparatus.

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Inorganic coating technology and commercial implications.

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*I. I. Islamoff*

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Space technology applications to industrial process development—welding, turbopumps, human waste as fuel, plastics, neurophysiology and computers. Symposium, June 1964.

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### **NASA Contributions to Advanced Valve Technology**

*L. C. Burmeister, J. B. Loser,  
E. C. Sneeegas*

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### **Vibrating Diaphragm Pressure Transducer**

*J. D. King*

Vibrating diaphragm transducer for pressure measurements in wind tunnels—construction, sensitivity, stability, energy losses, and cost estimates.

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*J. C. Sturman*  
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 N65-23694 21 pp  
 Avail NTIS 1965
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 Avail NTIS 1965
- Bibliography on Welding Methods**  
 Welding methods bibliography with abstracts, and subject and author indices.  
 NASA SP-5024  
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 Avail NTIS 1966
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 Method for plating copper on aluminum using phosphate anodizing process.  
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*I. A. Black, P. E. Glaser, R. S. Lindstrom, et al.*  
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 Avail NTIS 1967

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*P. D. Frost*

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Elastic orifice in externally pressurized gas bearings.

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### Symposium on Technology Status and Trends

Aerospace technological developments, trends, and potential commercial applications. Symposium, April 1965.

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### Microelectronics in Space Research

*R. M. Burger*

Technology survey of microelectronics in space research.

NASA SP-5031  
N66-10414 131 pp  
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### Plasma Jet Technology

*J. B. Bond, P. R. Dennis,  
D. W. Gates, et al.*

Survey on industrial applications of plasma arc devices.

NASA SP-5033  
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*V. D. Barth*

Tungsten powder metallurgy technology related to space vehicles and less traditional applications.

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### Bibliography on Electromechanical Transducers

Annotated bibliography on applications of electromechanical transducers.

NASA SP-5036  
N66-17359 44 pp  
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NASA SP-5037  
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### Magnetic Tape Recording

*S. W. Athey*

Types of magnetic recording, elements of the tape recorder, recording methods, recorder electronics.

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### Structural Design Concepts: Some NASA Contributions

*L. A. Scipio, A. L. Scipio*

Structural design, reinforced and composite materials and their applications.

NASA SP-5039  
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*D. C. Martin*

Brazing aluminum to titanium coated stainless steel to minimize formation of inter-metallic compounds in joint.

NASA SP-5040  
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*W. J. Jones, W. C. Simpson*

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*R. A. Fowler*

Geodetic laser system for earthquake prediction and engineering research.

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Avail NTIS 1968

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Equipment specifications and electrical properties of flat conductor cable systems.

NASA SP-5043  
N68-28879 54 pp  
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Method for casting and construction of wind tunnel models.

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N66-23562 27 pp  
Avail NTIS 1965

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Electronic circuit technology for industrial and commercial applications.

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*W. R. Corliss, E. G. Johnson*

Design and application potentials of general purpose, dexterous, cybernetic machines for human augmentation.

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Application of NASA mathematical management models and systems analyses in private industry and economy.

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Metallurgy, behavior, and application of 18 percent nickel maraging steels.

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### **Joining Ceramics and Graphite to Other Materials**

*R. M. Evans, R. E. Monroe,  
H. E. Pattee*

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### **Conference on Selected Technology for the Petroleum Industry**

Selected aerospace technology for petroleum industry representatives—combustion, heat transfer, surface physics and chemistry, lubricants and bearings, hydrodynamics. Conference, December 1965.

NASA SP-5053  
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*B. Ettelson, M. Klagsbrun,  
D. Ukkestad, et al.*

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Theory and developments in fiber-reinforced composites, whiskers, fibers, and metal wires.

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### **Selected Technology for the Electric Power Industry**

Selected conference papers on NASA technology utilization for electric power industry. Conference, September 1968.

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### **NASA Contributions to Fluid-Film Lubrication**

Survey of incompressible and compressible fluid film hydrostatic and hydrodynamic lubrication.

NASA SP-5058  
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### **Solid Lubricants**

*M. E. Campbell*

Survey of development in solid lubrication.

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*S. Korman*

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*E. J. Henley, H. K. Staffin,  
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Semipermeable membrane technology for commercial and industrial applications.

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*H. M. Gadberry, J. B. Loser,  
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High velocity electromagnetic, electrohydraulic, explosive, and pneumatic-mechanical methods of metal working.

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Physical properties, metallurgical processes, and applications of magnesium-lithium alloys.

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Air pollution monitoring instrumentation developed for aerospace uses surveyed for industrial applications.

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Runway and highway pavement grooving and traction studies. Conference, November 1968.

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Clean room technology for control of contaminants for component reliability.

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Technology utilization by industries of aerospace sciences and systems. Conference, May 1969.

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Proceedings from colloquium on transfer of teleoperator device technology. February 1969.

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Organic and inorganic adhesives for bonding of stainless steels and precipitation hardened stainless steels.

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Materials for improved fire safety with application to design and development of spacecraft and support equipment. Conference, May 1970.

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- Technology Utilization Program Report, 1973**  
Development of externally rechargeable pacemaker, use of ferrofluids in separation of nonferrous metals, development of breathing system for firefighters.  
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*O. Carlson, L. Dosa, W. Leavitt*  
Adaptation of technological innovations from the NASA space program to industrial and domestic use.  
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*N. P. Ruzic*  
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| NASA SP-5967(01)   |       |  | NASA SP-5973(01)   |       |  |
| N74-28688  | 14 pp |  | N74-34173  | 26 pp |  |
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| NASA SP-5967(02)   |       |  | <b>Optics and Lasers: A Compilation</b>  |       |  |
| N74-33678  | 20 pp |  | NASA SP-5973(02)   |       |  |
| Avail NTIS   | 1974  |  | N76-20465  | 31 pp |  |
| <b>Electrical and Electronic Devices and Components: A Compilation</b> |       |  | Avail NTIS   | 1976  |  |
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| N75-33324  | 29 pp |  | NASA SP-5973(03)   |       |  |
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| Avail NTIS   | 1975  |  | N74-33605  | 26 pp |  |
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| Avail NTIS   | 1975  |  | N76-20490  | 30 pp |  |
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### Reliability Program Evaluation Procedures

NASA SP-6002  
N63-21912 52 pp  
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### Quality Program Evaluation Procedures

NASA SP-6003  
N63-21435 69 pp  
Avail NTIS 1963

### Mass Properties Standards

*M. L. Seccomb*

System for management of mass properties during procurement and use of space vehicles.

NASA SP-6004  
N65-24019 92 pp  
Avail NTIS 1965

### Electrical Power Management Standard

Management standards for electrical power control during procurement and use of space vehicles in Apollo project.

NASA SP-6005  
N65-27944 36 pp  
Avail NTIS 1965

### Weight/Performance Management Survey Manual

Weight/performance management survey manual for Apollo project.

NASA SP-6006  
N65-34436 34 pp  
Avail NTIS 1965

### Electrical Power Management Survey Manual

Procedures for management audit of NASA Apollo Program.

NASA SP-6007  
N65-33831 33 pp  
Avail NTIS 1965

### Structural Systems and Program Decisions

Computer weight/performance prediction method to assess design and program and to optimize structural systems similar to those of Saturn V for management planning.

#### Volume 1

NASA SP-6008  
N66-31233 437 pp  
Avail NTIS 1966

#### Volume 2

NASA SP-6008(01)  
N66-33076 276 pp  
Avail NTIS 1966

### Forecasts and Appraisals for Management Evaluation

Weight/performance data, mathematical models, probable error relationships for Apollo project.

#### Volume 1

NASA SP-6009  
N66-29966 229 pp  
Avail NTIS 1965

#### Volume 2

NASA SP-6009(01)  
N66-29967 405 pp  
Avail NTIS 1966

### An Introduction to the Evaluation of Reliability Programs

*D. S. Liberman, A. J. Slechter*

Basic fundamentals applying to evaluation of reliability program effectiveness.

NASA SP-6501  
N67-19275 67 pp  
Avail NTIS 1967

### Elements of Design Review for Space Systems

*R. E. Boss, C. H. McGaffin*

Design review procedures for space system contractors to optimize design and functional performance in terms of total system requirements.

NASA SP-6502  
N67-33400 62 pp  
Avail NTIS 1967



**Introduction to the Derivation of Mission Requirements Profiles for System Elements**

*Development of mission requirement profile for subsystem components from overall system profile.*

NASA SP-6503  
N68-15683 91 pp  
Avail NTIS 1967

**Failure Reporting and Management Techniques in the Surveyor Program**

*E. F. Grant, D. S. Liberman,  
F. A. Paul*

NASA SP-6504  
N67-90166 43 pp  
Avail NTIS 1967

**Parts and Materials Application Review for Space Systems**

*R. E. Boss, J. P. Craig,  
S. J. Henkel, Jr.*

Parts and materials application review for project management of space systems engineering.

NASA SP-6505  
N68-10120 58 pp  
Avail NTIS 1967

**An Introduction to the Assurance of Human Performance in Space Systems**

*Human factors engineering techniques for reducing human errors in space systems development.*

NASA SP-6506  
N68-20357 42 pp  
Avail NTIS 1968

**Parts, Materials, and Processes Experience Summary**

Volume I

NASA SP-6507  
N74-20070 337 pp  
Avail NTIS 1973

Volume II

NASA SP-6507  
N74-14140 381 pp  
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**Failure Analysis of Electronic Parts: Laboratory Methods**

*R. J. Anstead, E. Goldberg*

NASA SP-6508  
N75-23853 79 pp  
Avail NTIS 1975

**Techniques of Final Preseal Visual Inspection**

*R. J. Anstead*

NASA SP-6509  
N75-25205 63 pp  
Avail NTIS 1975

## Bibliographies

### Contract Number Index to Reports Announced in STAR

Contract number index of scientific and technical aerospace reports—information retrieval.

NASA SP-7001  
N64-17262 197 pp  
Avail NTIS 1964

### High Energy Propellants: A Continuing Bibliography

Published annually from 1964 to 1967.

NASA SP-7002  
Avail NTIS

### Lunar Surface Studies: A Continuing Bibliography

Published annually from 1964 to 1968.

NASA SP-7003  
Avail NTIS

### Communications Satellites: A Continuing Bibliography

Published annually from 1964 to 1968.

NASA SP-7004  
Avail NTIS

### A Selected Listing of NASA Scientific and Technical Reports for 1963

NASA SP-7005  
N64-19889 245 pp  
Avail NTIS 1964

### Bibliographies on Aerospace Science: A Continuing Bibliography

Published in 1964, 1965, 1966, 1968.

NASA SP-7006  
Avail NTIS

### Preparing Contractor Reports for NASA: Repro Typing and Layout

NASA SP-7007  
N64-28073 19 pp  
Avail GPO 1963

### Preparing Contractor Reports for NASA: Technical Illustrating

Technical illustrating: graphs, line drawings, perspective drawing, photographs, typography, and layout.

NASA SP-7008  
N64-26749 27 pp  
Avail GPO 1964

### Lasers and Masers: A Continuing Bibliography

Published annually from 1965 to 1968.

NASA SP-7009  
N65-25599 283 pp  
Avail NTIS 1965

### Clarity in Technical Reporting

*S. Katzoff*

Mechanisms for writing abstracts and technical reports.

NASA SP-7010  
N64-26421 30 pp  
Avail GPO 1964

### Aerospace Medicine and Biology: A Continuing Bibliography

Published monthly.\*

NASA SP-7011  
Avail NTIS

### The International System of Units: Physical Constants and Conversion Factors

*E. A. Mechtly*

Tables of conversion factors and physical constants in International System of Units.

NASA SP-7012  
N73-26969 23 pp  
Avail GPO 1973

### NASA Publications Manual, 1974

NASA SP-7013  
N75-13676 57 pp  
Avail GPO 1974

### Bibliography Related to Human Factors System Program, July 1962–February 1964

*R. J. Potocko*

NASA SP-7014  
N64-28317 242 pp  
Avail NTIS 1964

### Extraterrestrial Life: A Bibliography

Part I. Report Literature

NASA SP-7015  
N65-16598 80 pp  
Avail NTIS 1964

Part II. Published Literature

NASA SP-7015  
N66-16566 345 pp  
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\* Available through NTIS subscription service.

**Guide to the Subject Indexes for Scientific and Technical Aerospace Reports**

Guide to subject indexes for aerospace scientific and technological information processing and retrieval.

NASA SP-7016  
N66-35686 471 pp  
Avail NTIS 1966

**Planetary Atmospheres: A Continuing Bibliography**

Published in 1965, 1966, and 1968.

NASA SP-7017  
Avail NTIS

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Avail NTIS 1964

**Lubrication, Corrosion, and Wear: A Continuing Bibliography**

Published in 1965, 1966, and 1968.

NASA SP-7020  
Avail NTIS

**Ballistocardiography: A Bibliography**

NASA SP-7021  
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*L. C. Bickford, R. F. Filipowsky*

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NASA SP-7022(01)  
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**Volume 2. Coding and Detection Theory**

NASA SP-7022(02)  
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**Volume 3. Information Processing and Advanced Techniques**

NASA SP-7022(03)  
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**Space Communications: Theory and Applications: A Bibliography (cont.)**

**Volume 4. Satellite and Deep Space Applications**

NASA SP-7022(04)  
N65-32187 303 pp  
Avail NTIS 1965

**An Annotated Bibliography of Computer-Aided Circuit Analysis and Design**

*C. W. Meissner, Jr.*

NASA SP-7023  
N68-19882 44 pp  
Avail NTIS 1968

**A Selected Listing of NASA Scientific and Technical Reports for 1965**

Annotated bibliography on NASA scientific and technical reports for 1965 with corporate source, subject, and author indexes.

NASA SP-7024  
N66-26846 1402 pp  
Avail NTIS 1966

**Preparing Contractor Reports for NASA: Data Presentation**

*P. P. Taylor, Jr.*

Guidelines for presentation of graphical and tabular data.

NASA SP-7025  
N66-38488 32 pp  
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**Particles and Fields Research: A Bibliography**

*W. N. Hess, G. D. Mead*

Rocket and satellite research bibliography on magnetic and electric fields, and cosmic energetic particles.

NASA SP-7026  
N66-30156 173 pp  
Avail NTIS 1966

**Secondary Aerospace Batteries and Battery Materials: A Bibliography**

*G. Halpert, W. H. Webster, Jr.*

Annotated bibliography on secondary aerospace battery materials and related processes from 1923 through 1968.

NASA SP-7027  
N70-22825 154 pp  
Avail NTIS 1969

**A Selected Listing of NASA Scientific and Technical Reports for 1966**

NASA SP-7028  
N67-29260 2078 pp  
Avail GPO 1967

### **NASA Scientific and Technical Reports for 1967: A Selected Listing**

NASA SP-7029  
N68-29039 424 pp  
Avail NTIS 1968

### **NASA Thesaurus**

Subject terms for indexing scientific and technical information.

#### **Volume I. Alphabetical Listing, A-L**

NASA SP-7030  
N68-11307 441 pp  
Avail NTIS 1967

#### **Volume II. Alphabetical Listing, M-Z**

NASA SP-7030  
N68-11308 428 pp  
Avail NTIS 1967

#### **Volume III. Appendixes**

NASA SP-7030  
N68-11309 651 pp  
Avail NTIS 1967

### **Properties of Selected Radioisotopes. Volume I: Unclassified Literature**

*J. Epstein, D. Harris*

Annotated bibliography of nuclear, chemical, and physical properties of nine radioactive isotopes.

NASA SP-7031  
N68-29959 189 pp  
Avail NTIS 1968

### **Properties of Selected Radioisotopes. Volume II: Classified Literature**

*J. Epstein, D. Harris*

NASA SP-7032 46 pp  
X69-50006 1968

### **NASA Scientific and Technical Reports for 1968: A Selected Listing**

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N69-29492 453 pp  
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### **R and D Reporting: Guidance for Technical Monitors of NASA Contracts**

Options and information resources open to NASA monitors.

NASA SP-7034  
N70-14397 16 pp  
Avail NTIS 1969

### **NASA Scientific and Technical Reports and Publications for 1969: A Selected Listing**

Bibliographic citations and abstracts of NASA scientific and technical reports with indexes.

NASA SP-7035  
N70-34702 950 pp  
Avail GPO 1970

### **Remote Sensing of Earth Resources: A Literature Survey With Indexes**

Annotated bibliography of literature on remote sensing of Earth resources announced between January/February 1962 and 1970.

NASA SP-7036  
N70-41047 1220 pp  
Avail NTIS 1970

### **Remote Sensing of Earth Resources (Supplement)**

#### **Section 1. Abstracts**

NASA SP-7036(01)  
N75-25235 654 pp  
Avail NTIS 1975

#### **Section 2. Indexes**

NASA SP-7036(01)  
N75-25236 402 pp  
Avail NTIS 1975

### **Aeronautical Engineering: A Special Bibliography**

Published monthly.\*

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### **Significant NASA Inventions Available for Licensing in Foreign Countries**

Published in 1971, 1973, 1974, 1975, 1976, 1977.

NASA SP-7038  
Avail GPO

### **NASA Patent Abstracts Bibliography: A Continuing Bibliography**

Published semiannually.\*

NASA SP-7039  
Avail NTIS

### **NASA Thesaurus Alphabetical Update**

Thesaurus of postable and nonpostable subject terms currently approved for use in NASA scientific and technical information system.

NASA SP-7040  
N72-15923 619 pp  
Avail NTIS 1971

\* Available through NTIS subscription service.

**Earth Resources: A Continuing Bibliography**

Published quarterly.\*

NASA SP-7041

Avail NTIS

**Energy: A Special Bibliography With Indexes**

NASA SP-7042

N74-29337 534 pp

Avail NTIS 1974

**Energy: A Continuing Bibliography With Indexes**

Published quarterly.\*

NASA SP-7043

Avail NTIS

**Secondary Aerospace Batteries and Battery Materials: A Bibliography (1969-1974)**

*P. McDermott, G. Halpert,  
S. Ekparyaskun, et al.*

NASA SP-7044

N77-16437 161 pp

Avail NTIS 1976

**Technology for Large Space Systems: A Continuing Bibliography**

NASA SP-7046

N79-20146 164 pp

Avail NTIS 1979

**NASA Thesaurus**

Volume I. Alphabetical Listing

NASA SP-7050

N76-17992 820 pp

Avail NTIS 1976

Volume II. Access Vocabulary

NASA SP-7050

N76-17993 442 pp

Avail NTIS 1976

**NASA Guidelines on Report Literature**

NASA seeks for inclusion in its Scientific and Technical Information System research reports, conference proceedings, meeting papers, monographs, and doctoral and post-graduate theses which relate to the NASA mission and objectives. Topics of interest to NASA are presented.

NASA SP-7200

N79-13914 27 pp

Avail NTIS 1978

**Management: A Continuing Literature Survey With Indexes**

Published annually.\*

NASA SP-7500

Avail NTIS

**The Systems Approach to Management. An Annotated Bibliography With Indexes**

NASA SP-7501

N69-34917 69 pp

Avail NTIS 1969

**OGO Program Summary: The Orbiting Geophysical Observatories**

*J. E. Jackson, J. I. Vette*

NASA SP-7601

N76-19643 307 pp

Avail NTIS 1975

\* Available through NTIS subscription service.

## Space Vehicle Design Criteria

### Buffeting During Atmospheric Ascent

Aeroelastic spacecraft design to minimize buffeting during atmospheric ascent.

NASA SP-8001  
N71-20473 19 pp  
Avail NTIS 1970

### Flight-Loads Measurements During Launch and Exit

NASA SP-8002  
N66-85660 7 pp  
Avail NTIS 1964

### Flutter, Buzz, and Divergence

NASA SP-8003  
N70-71604 10 pp  
Avail NTIS 1964

### Panel Flutter

Criteria for predicting, preventing, and evaluating panel flutter.

NASA SP-8004  
N73-11932 52 pp  
Avail NTIS 1972

### Solar Electromagnetic Radiation

Values for solar constant and solar spectral irradiance based on air and spaceborne observations for use in design of spacecraft, space vehicles, subsystems, and experiments.

NASA SP-8005  
N71-30888 36 pp  
Avail NTIS 1971

### Local Steady Aerodynamic Loads During Launch and Exit

NASA SP-8006  
N70-71605 12 pp  
Avail NTIS 1965

### Buckling of Thin-Walled Circular Cylinders

Predicting buckling of thin-walled, uniform stiffened and unstiffened circular cylindrical shells under static loading.

NASA SP-8007  
N69-23320 58 pp  
Avail NTIS 1968

### Prelaunch Ground Wind Loads

NASA SP-8008  
N70-71628 16 pp  
Avail NTIS 1965

### Propellant Slosh Loads

NASA SP-8009  
N69-14553 188 pp  
Avail NTIS 1968

### Models of Mars Atmosphere (1974)

NASA SP-8010  
N75-19107 52 pp  
Avail NTIS 1974

### Models of Venus Atmosphere (1972)

Engineering models of Venus atmosphere, based on theory and measured data.

NASA SP-8011  
N73-16824 63 pp  
Avail NTIS 1972

### Natural Vibration Model Analysis

*J. S. Archer*

Natural vibration model analysis as related to space vehicle design criteria.

NASA SP-8012  
N69-22773 35 pp  
Avail NTIS 1968

### Meteoroid Environment Model—1969 (Near Earth to Lunar Surface)

Meteoroid environment model for cometary origin near Earth to lunar surface.

NASA SP-8013  
N69-40326 35 pp  
Avail NTIS 1969

### Entry Thermal Protection

NASA SP-8014  
N69-71545 37 pp  
Avail NTIS 1968

### Guidance and Navigation for Entry Vehicles

Guidance and navigation for atmospheric entry phase of vehicles.

NASA SP-8015  
N69-19518 47 pp  
Avail NTIS 1968

### Effects of Structural Flexibility on Spacecraft Control Systems

Design and test criteria regarding structural flexibility effects on spacecraft stability and control systems.

NASA SP-8016  
N69-37030 70 pp  
Avail NTIS 1969

### **Magnetic Fields—Earth and Extraterrestrial**

Strength and direction data on Earth and extraterrestrial magnetic fields for guidance in vehicle design.

NASA SP-8017  
N69-40269 70 pp  
Avail NTIS 1969

### **Spacecraft Magnetic Torques**

Magnetic torque resulting from interaction between magnetic properties of spacecraft and ambient magnetic field.

NASA SP-8018  
N69-30339 55 pp  
Avail NTIS 1969

### **Buckling of Thin-Walled Truncated Cones**

Buckling of thin-walled truncated conical shells under static loads.

NASA SP-8019  
N69-24131 32 pp  
Avail NTIS 1968

### **Surface Models of Mars (1975)**

NASA SP-8020  
N75-32989 84 pp  
Avail NTIS 1975

### **Models of Earth's Atmosphere (90 to 2500 km)**

Model for predicting atmospheric parameters at altitudes between 90 and 2500 km.

NASA SP-8021  
N73-27325 63 pp  
Avail NTIS 1973

### **Staging Loads**

Analysis of loads produced on spacecraft by staging operations and practices to ensure that staging loads are included in spacecraft design.

NASA SP-8022  
N71-28634 30 pp  
Avail NTIS 1969

### **Lunar Surface Models**

Engineering models of lunar topography including dielectric, optical, terrain, and crater models.

NASA SP-8023  
N70-18901 60 pp  
Avail NTIS 1969

### **Spacecraft Gravitational Torques**

Gravitational torque effects and analysis for satellite design.

NASA SP-8024  
N70-23418 51 pp  
Avail NTIS 1969

### **Solid Rocket Motor Metal Cases**

Guidelines and practices for design of solid rocket motor cases.

NASA SP-8025  
N70-29740 103 pp  
Avail NTIS 1970

### **Spacecraft Star Trackers**

Design criteria for spacecraft star trackers.

NASA SP-8026  
N70-38721 69 pp  
Avail NTIS 1970

### **Spacecraft Radiation Torques**

Radiation torque sources and effects on spacecraft and spacecraft attitude control system design.

NASA SP-8027  
N71-24312 41 pp  
Avail NTIS 1969

### **Entry Vehicle Control**

Stabilization and control systems for reentry vehicles.

NASA SP-8028  
N70-28538 51 pp  
Avail NTIS 1969

### **Aerodynamic and Rocket-Exhaust Heating During Launch and Ascent**

NASA SP-8029  
N70-18828 33 pp  
Avail NTIS 1969

### **Transient Loads From Thrust Excitation**

Analysis of transient loads produced by ignition of rocket engine during launch and flight operations for solid and liquid propellant rocket engines.

NASA SP-8030  
N71-24281 28 pp  
Avail NTIS 1969

### **Slosh Suppression**

Slosh suppression devices for aerospace vehicle control stability.

NASA SP-8031  
N70-21848 36 pp  
Avail NTIS 1969

### **Buckling of Thin-Walled Doubly Curved Shells**

Criteria and recommended practices for design of compressively loaded thin-walled doubly curved shells.

NASA SP-8032  
N70-22356 35 pp  
Avail NTIS 1969

**Spacecraft Earth Horizon Sensors**

Engineering design of spacecraft Earth horizon sensors.

NASA SP-8033  
N70-35570 49 pp  
Avail NTIS 1969

**Spacecraft Mass Expulsion Torques**

Spacecraft design considerations associated with disturbance torques caused by mass expulsion.

NASA SP-8034  
N70-36852 39 pp  
Avail NTIS 1969

**Wind Loads During Ascent**

Determining wind induced structural loads on space vehicles during ascent.

NASA SP-8035  
N70-36953 36 pp  
Avail NTIS 1970

**Effects of Structural Flexibility on Launch Vehicle Control Systems**

Structural flexibility effects on launch vehicle control systems and design criteria.

NASA SP-8036  
N70-39774 51 pp  
Avail NTIS 1970

**Assessment and Control of Spacecraft Magnetic Fields**

NASA SP-8037  
N71-13078 30 pp  
Avail NTIS 1970

**Meteoroid Environment Model—1970 (Interplanetary and Planetary)**

Astronomical meteoroid environment model for space missions.

NASA SP-8038  
N71-17525 69 pp  
Avail NTIS 1970

**Solid Rocket Motor Performance Analysis and Prediction**

Current design practices and technology for predicting propulsion performance of solid propellant rocket engine designs.

NASA SP-8039  
N72-18785 113 pp  
Avail NTIS 1971

**Fracture Control of Metallic Pressure Vessels**

Design criteria for fracture optimization of metallic pressure vessels.

NASA SP-8040  
N71-14130 65 pp  
Avail NTIS 1970

**Captive-Fired Testing of Solid Rocket Motors**

Captive-fired testing of solid rocket motors for design criteria.

NASA SP-8041  
N71-30866 101 pp  
Avail NTIS 1971

**Meteoroid Damage Assessment**

Meteoroid damage determination and spacecraft structure protection and reliability.

NASA SP-8042  
N71-25070 59 pp  
Avail NTIS 1970

**Design-Development Testing**

Criteria and procedures for testing spacecraft structural elements and components.

NASA SP-8043  
N71-25069 55 pp  
Avail NTIS 1970

**Qualification Testing**

Qualification tests conducted on flight quality components, subsystems, and systems to prove that structural design requirements have been achieved.

NASA SP-8044  
N71-29045 30 pp  
Avail NTIS 1970

**Acceptance Testing**

Standardization of structural acceptance tests conducted on flight hardware.

NASA SP-8045  
N71-31033 54 pp  
Avail NTIS 1970

**Landing Impact Attenuation for Non-Surface-Planing Landers**

NASA SP-8046  
N70-38294 47 pp  
Avail NTIS 1970

**Spacecraft Sun Sensors**

Design criteria and performance specifications for spacecraft Sun sensors.

NASA SP-8047  
N71-17756 42 pp  
Avail NTIS 1970

**Liquid Rocket Engine Turbopump Bearings**

Bearing requirements for liquid rocket engine turbopumps.

NASA SP-8048  
N71-28011 85 pp  
Avail NTIS 1971



### **The Earth's Ionosphere**

Space vehicle design with considerations for ionospheric electron and ionic density, plasma temperature of ionosphere, and neutral component.

NASA SP-8049  
N71-30849 49 pp  
Avail NTIS 1971

### **Structural Vibration Prediction**

Internal loads and stresses caused by space vehicle vibration resulting from induced or natural environments.

NASA SP-8050  
N71-19281 41 pp  
Avail NTIS 1970

### **Solid Rocket Motor Igniters**

Design approach for solid propellant rocket igniters.

NASA SP-8051  
N71-30346 111 pp  
Avail NTIS 1971

### **Liquid Rocket Engine Turbopump Inducers**

Design criteria for liquid rocket engine turbopump inducers.

NASA SP-8052  
N71-34950 255 pp  
Avail NTIS 1971

### **Nuclear and Space Radiation Effects on Materials**

Effects of nuclear and space radiation on mechanical, thermal, and optical properties of spacecraft structural materials.

NASA SP-8053  
N71-25034 48 pp  
Avail NTIS 1970

### **Space Radiation Protection**

Criteria and procedures for determining dosage of penetrating space radiation and design of appropriate protection for space vehicles.

NASA SP-8054  
N71-25075 50 pp  
Avail NTIS 1970

### **Prevention of Coupled Structure-Propulsion Instability (Pogo)**

NASA SP-8055  
N71-26080 51 pp  
Avail NTIS 1970

### **Flight Separation Mechanisms**

Criteria and recommended practices for designing and testing flight separation mechanisms.

NASA SP-8056  
N71-28986 39 pp  
Avail NTIS 1970

### **Structural Design Criteria Applicable to A Space Shuttle**

Updated structural design criteria for manned space shuttle missions.

NASA SP-8057  
N73-17881 99 pp  
Avail NTIS 1972

### **Spacecraft Aerodynamic Torques**

Assessment of disturbance torques due to interaction of spacecraft with atmosphere in long duration orbits for use in design of spacecraft attitude control systems.

NASA SP-8058  
N71-25935 37 pp  
Avail NTIS 1971

### **Spacecraft Attitude Control During Thrusting Maneuvers**

NASA SP-8059  
N71-26198 51 pp  
Avail NTIS 1971

### **Compartment Venting**

Analysis of internal and external gas venting system of spacecraft.

NASA SP-8060  
N71-28166 31 pp  
Avail NTIS 1970

### **Interactions With Umbilicals and Launch Stand**

Criteria and recommendations to ensure compatible interfaces between space vehicle structure and launch stand ground support equipment.

NASA SP-8061  
N71-28829 23 pp  
Avail NTIS 1970

### **Entry Gasdynamic Heating**

Determining heat transfer to space vehicles entering planetary atmospheres for proper design and thermal protection.

NASA SP-8062  
N71-31179 60 pp  
Avail NTIS 1971

### **Lubrication, Friction, and Wear**

Lubrication, friction, and wear processes analyzed for space vehicle design criteria.

NASA SP-8063  
N71-31471 180 pp  
Avail NTIS 1971

### **Solid Propellant Selection and Characterization**

Analysis of properties of solid rocket propellants and parameters which affect choice of propellant for specific applications.

NASA SP-8064  
N72-13737 116 pp  
Avail NTIS 1971

### **Tubular Spacecraft Booms (Extendible, Reel Stored)**

Development of reliable and operational design programs for spacecraft guidance and control.

NASA SP-8065  
N71-33330 52 pp  
Avail NTIS 1971

### **Deployable Aerodynamic Deceleration Systems**

Criteria and recommended practices for design, selection, analysis, and testing of deployable aerodynamic deceleration systems.

NASA SP-8066  
N71-31303 88 pp  
Avail NTIS 1971

### **Earth Albedo and Emitted Radiation**

Global annual averages of Earth albedo and radiation used to estimate long term effects on space vehicle equipment and surfaces.

NASA SP-8067  
N71-35104 48 pp  
Avail NTIS 1971

### **Buckling Strength of Structural Plates**

Designs for determining buckling strength of structural plates for spacecraft.

NASA SP-8068  
N71-35331 50 pp  
Avail NTIS 1971

### **The Planet Jupiter (1970)**

Visible, infrared, and radio observations of Jupiter using Earth based and airborne equipment.

NASA SP-8069  
N72-17009 93 pp  
Avail NTIS 1971

### **Spaceborne Digital Computer Systems**

Design criteria for guidance and control spaceborne computer selection including physical and functional characteristics and reliability.

NASA SP-8070  
N71-33679 82 pp  
Avail NTIS 1971

### **Passive Gravity-Gradient Libration Dampers**

NASA SP-8071  
N71-34590 60 pp  
Avail NTIS 1971

### **Acoustic Loads Generated by the Propulsion System**

Design of flightworthy space vehicle.

NASA SP-8072  
N71-33195 54 pp  
Avail NTIS 1971

### **Solid Propellant Grain Structural Integrity Analysis**

NASA SP-8073  
N74-19389 114 pp  
Avail NTIS 1973

### **Spacecraft Solar Cell Arrays**

NASA SP-8074  
N71-37630 54 pp  
Avail NTIS 1971

### **Solid Propellant Processing Factors in Rocket Motor Design**

NASA SP-8075  
N72-31767 82 pp  
Avail NTIS 1971

### **Solid Propellant Grain Design and Internal Ballistics**

NASA SP-8076  
N73-15804 110 pp  
Avail NTIS 1972

### **Transportation and Handling Loads**

Criteria and recommended practices for predicting and verifying transportation and handling loads for space vehicle structure or major segments.

NASA SP-8077  
N72-12891 48 pp  
Avail NTIS 1971

### **Spaceborne Electronic Imaging Systems**

Criteria and recommended practices for designing spaceborne elements of electronic imaging systems.

NASA SP-8078  
N72-14169 71 pp  
Avail NTIS 1971

### **Structural Interaction With Control Systems**

Predictions of structural interrelationships with spacecraft active and passive control systems to determine optimum design.

NASA SP-8079  
N72-17920 56 pp  
Avail NTIS 1971

### **Liquid Rocket Pressure Regulators, Relief Valves, Check Valves, Burst Discs, and Explosive Valves**

NASA SP-8080  
N74-10724 123 pp  
Avail NTIS 1973

### **Liquid Propellant Gas Generators**

Design of gas turbine for furnishing hot gases for turbine drives and analysis of limitations imposed by thermal stresses.

NASA SP-8081  
N73-27705 110 pp  
Avail NTIS 1972

### **Stress-Corrosion Cracking in Metals**

Criteria and recommended practices for preventing stress-corrosion cracking in spacecraft structures.

NASA SP-8082  
N72-17928 42 pp  
Avail NTIS 1971

### **Discontinuity Stresses in Metallic Pressure Vessels**

NASA SP-8083  
N72-26933 69 pp  
Avail NTIS 1971

### **Surface Atmospheric Extremes (Launch and Transportation Areas)**

Effects of atmospheric surface parameters on space vehicle design and operation.

NASA SP-8084  
N74-30047 77 pp  
Avail NTIS 1974

### **The Planet Mercury (1971)**

Physical properties of Mercury, including atmosphere and surface, for space vehicle design criteria.

NASA SP-8085  
N72-20799 63 pp  
Avail NTIS 1972

### **Space Vehicle Displays Design Criteria**

Design and evaluation of spacecraft display guidance and control systems.

NASA SP-8086  
N72-26337 45 pp  
Avail NTIS 1972

### **Liquid Rocket Engine Fluid-Cooled Combustion Chambers**

Monograph for design and development of combustion chambers for liquid propellant rocket engines.

NASA SP-8087  
N73-31697 120 pp  
Avail NTIS 1972

### **Liquid Rocket Metal Tanks and Tank Components**

NASA SP-8088  
N75-13022 165 pp  
Avail NTIS 1974

### **Liquid Rocket Engine Injectors**

NASA SP-8089  
N76-30284 130 pp  
Avail NTIS 1976

### **Liquid Rocket Actuators and Operators**

NASA SP-8090  
N74-17785 158 pp  
Avail NTIS 1973

### **The Planet Saturn (1970)**

Saturn planet and environment data for spacecraft designers.

NASA SP-8091  
N72-29840 103 pp  
Avail NTIS 1972

### **Assessment and Control of Spacecraft Electromagnetic Interference**

Design criteria relating to assessment and control of spacecraft electromagnetic interference.

NASA SP-8092  
N72-26119 57 pp  
Avail NTIS 1972

### **Solid Rocket Motor Internal Insulation**

NASA SP-8093  
N77-30171 124 pp  
Avail NTIS 1976

### **Liquid Rocket Engine Valve Components**

NASA SP-8094  
N74-27276 150 pp  
Avail NTIS 1973

### **Preliminary Criteria for the Fracture Control of Space Shuttle Structures**

NASA SP-8095  
N72-25851 16 pp  
Avail NTIS 1971

### **Space Vehicle Gyroscope Sensor Application**

Analysis of factors involved in specification, design, and evaluation of gyroscopes for spaceborne sensor applications.

NASA SP-8096  
N73-12680 87 pp  
Avail NTIS 1972

### **Liquid Rocket Valve Assemblies**

NASA SP-8097  
N74-26979 154 pp  
Avail NTIS 1973

### **Effects of Structural Flexibility on Entry Vehicle Control Systems**

NASA SP-8098  
N72-29870 68 pp  
Avail NTIS 1972

### **Combining Ascent Loads**

Criteria and guidelines for combining loads during ascent phase of space flight.

NASA SP-8099  
N73-11897 36 pp  
Avail NTIS 1972

### **Liquid Rocket Engine Turbopump Gears**

NASA SP-8100  
N75-10166 117 pp  
Avail NTIS 1974

### **Liquid Rocket Engine Turbopump Shafts and Couplings**

NASA SP-8101  
N74-14441 130 pp  
Avail NTIS 1972

### **Space Vehicle Accelerometer Applications**

NASA SP-8102  
N75-26891 87 pp  
Avail NTIS 1972

### **The Planets Uranus, Neptune, and Pluto (1971)**

Influence of Uranus, Neptune, and Pluto environment on design of spacecraft probes

NASA SP-8103  
N75-11870 92 pp  
Avail NTIS 1972

### **Structural Interaction With Transportation and Handling Systems**

Space vehicle design to withstand adverse conditions involved in handling and transportation from factory to launch site.

NASA SP-8104  
N73-21839 41 pp  
Avail NTIS 1973

### **Spacecraft Thermal Environment**

Guidance for assessment and control of spacecraft temperatures.

NASA SP-8105  
N73-26890 48 pp  
Avail NTIS 1973

### **Turbopump Systems for Liquid Rocket Engines**

NASA SP-8107  
N75-20470 168 pp  
Avail NTIS 1974

### **Advanced Composite Structures**

NASA SP-8108  
N76-12115 107 pp  
Avail NTIS 1974

### **Liquid Rocket Engine Centrifugal Flow Turbopumps**

NASA SP-8109  
N74-28961 116 pp  
Avail NTIS 1973

### **Liquid Rocket Engine Turbines**

NASA SP-8110  
N74-34245 158 pp  
Avail NTIS 1974

### **Assessment and Control of Electrostatic Charges**

NASA SP-8111  
N74-27534 53 pp  
Avail NTIS 1974

### **Pressurization Systems for Liquid Rockets**

NASA SP-8112  
N76-22300 167 pp  
Avail NTIS 1975

### **Liquid Rocket Engine Combustion Stabilization Devices**

NASA SP-8113  
N75-28247 127 pp  
Avail NTIS 1974

### **Solid Rocket Thrust Vector Control**

NASA SP-8114  
N76-17194 200 pp  
Avail NTIS 1974

**Solid Rocket Motor Nozzles**

NASA SP-8115  
N76-20214 140 pp  
Avail NTIS 1975

**The Earth's Trapped Radiation Belts**

NASA SP-8116  
N75-22980 100 pp  
Avail NTIS 1975

**Gravity Fields of the Solar System**

NASA SP-8117  
N75-24608 79 pp  
Avail NTIS 1975

**Interplanetary Charged Particle Models (1974)**

NASA SP-8118  
N75-24607 47 pp  
Avail NTIS 1975

**Liquid Rocket Disconnects, Couplings, Fittings, Fixed Joints, and Seals**

State of the art and design criteria for components used in liquid propellant rocket propulsion systems to contain and control the flow of fluids.

NASA SP-8119  
N77-24191 164 pp  
Avail NTIS 1976

**Liquid Rocket Engine Nozzles**

NASA SP-8120  
N77-16108 120 pp  
Avail NTIS 1976

**Liquid Rocket Engine Turbopump Rotating-Shaft Seals**

NASA SP-8121  
N78-30584 160 pp  
Avail NTIS 1978

**The Environment of Titan (1975)**

NASA SP-8122  
N7628138 45 pp  
Avail NTIS 1976

**Liquid Rocket Lines, Bellows, Flexible Hoses, and Filters**

NASA SP-8123  
N78-16089 186 pp  
Avail NTIS 1977

**Liquid Rocket Engine Self-Cooled Combustion Chambers**

NASA SP-8124  
N78-21211 130 pp  
Avail NTIS 1977

**Liquid Rocket Engine Axial Flow Turbopumps**

NASA SP-8125  
N78-31164 127 pp  
Avail NTIS 1978

**Glossary of Terms and Table of Conversion Factors Used in Design of Chemical Propulsion Systems**

NASA SP-8126  
N80-17136 89 pp  
Avail NTIS 1979

## Specifications

### **NASA Specifications and Standards**

NASA SP-9000

N67-34727

Avail NTIS

388 pp

1967

### **A Guide to NASA Data Handbooks**

Handbooks, manuals, procedures, instructions, and related technical data publications in NASA CENTRAL Information System.

NASA SP-9001

N67-18003

Avail NTIS

190 pp

1967

## Reference Publications

### Overall Loudness of Steady Sounds According to Theory and Experiment

*W. L. Howes*

A mathematical theory for calculating the loudness of any steady sound from information on its spectrum constructed from physical principles and psychological and physiological information on mammalian auditory systems.

NASA RP-1001  
N79-25753 150 pp  
Avail GPO 1979

### Cryogenic Foam Insulation: Abstracted Publications

*F. R. Williamson*

The properties of foam materials and the use of foams as thermal insulation at cryogenic temperatures.

NASA RP-1002  
N78-11200 171 pp  
Avail NTIS 1977

### Bibliography of Supersonic Cruise Aircraft Research (SCAR)

*S. Hoffman*

Propulsion, stratospheric emissions impact, structures and materials, aerodynamic performance, stability and control.

NASA RP-1003  
N78-12895 102 pp  
Avail NTIS 1977

### Fronts and Frontogenesis as Revealed by High Time Resolution Data

*A. E. Frank, D. A. Barber*

Upper air sounding used to examine a cold front of average intensity.

NASA RP-1005  
N77-30705 135 pp  
Avail NTIS 1977

### Correction Factors for On-Line Microprobe Analysis of Multielement Alloy Systems

*J. Unnam, D. R. Tenney, W. D. Brewer*

An on-line correction technique developed for the conversion of electron probe x-ray intensities into concentrations of emitting elements.

NASA RP-1006  
N78-15236 216 pp  
Avail NTIS 1977

### Viking Lander Imaging Investigation: Picture Catalog of Primary Mission Experiment Data Record

*R. B. Tucker*

Images returned by the two Viking Landers during the primary phase of the Viking Mission.

NASA RP-1007  
N78-20042 514 pp  
Avail NTIS 1978

### Lightning Protection of Aircraft

*F. A. Fisher, J. A. Plumer*

Potential lightning effects on aircraft and the means available to designers and operators to protect against the effects.

NASA RP-1008  
N78-11024 530 pp  
Avail NTIS 1977

### An Introduction to Orbit Dynamics and Its Application to Satellite-Based Earth Monitoring Systems

*D. R. Brooks*

The long-term behavior of satellites studied at a level of complexity suitable for the initial planning phases of Earth monitoring missions.

NASA RP-1009  
N78-12113 85 pp  
Avail NTIS 1977

### Chlorofluoromethanes and the Stratosphere

*R. D. Hudson*

Laboratory measurements, ozone measurements and trends, minor species and aerosol measurements, one-dimensional modeling, multidimensional modeling.

NASA RP-1010  
N77-31694 268 pp  
Avail NTIS 1977

### Thermodynamic and Related Properties of Oxygen From the Triple Point to 300 K at Pressures to 1000 Bar

*L. A. Weber*

The results of an experimental program presented in the form of PVT data in the temperature range 58 to 300 K at pressures up to 800 bar. Tables of the derived thermodynamic properties on isobars to 1000 bar are given.

NASA RP-1011  
N78-16119 164 pp  
Avail NTIS 1977

**Remote Sensing of Oceanic Parameters During the Skylab/Gamefish Experiment**

*K. H. Faller*

Effort to demonstrate the feasibility of using remotely acquired information to assess and monitor the distribution of oceanic gamefish.

NASA RP-1012

N78-12644

43 pp

Avail NTIS

1977

**Triple Point Determinations of Monomethylhydrazine and Nitrogen Tetroxide, 2.2 Percent by Weight Nitric Oxide**

*I. D. Smith, P. M. Dodge*

Tests performed to ascertain the triple points of monomethylhydrazine and nitrogen tetroxide. New experimental values for liquid monomethylhydrazine vapor pressure for temperatures from 275.2 to 207.6 K. Tentative values for the effective freezing point of nitrogen tetroxide in spacelike conditions.

NASA RP-1013

N78-13234

16 pp

Avail NTIS

1977

**An Outgassing Data Compilation of Spacecraft Materials**

*W. A. Campbell, Jr., R. S. Marriott, J. J. Park*

Outgassing data derived from tests at 398 K (125°C) or 24 hours in vacuum for numerous materials for spacecraft use.

NASA RP-1014

N78-17151

181 pp

Avail NTIS

1978

**Procedures for Gathering Ground Truth Information for a Supervised Approach to a Computer-Implemented Land Cover Classification of Landsat-Acquired Multispectral Scanner Data**

*A. T. Joyce*

NASA RP-1015

N78-15549

48 pp

Avail NTIS

1978

**The Use of Landsat Digital Data and Computer-Implemented Techniques for an Agricultural Application**

*A. T. Joyce, R. H. Griffin II*

Agricultural applications procedures for use of Landsat digital data and other digitalized data.

NASA RP-1016

N78-21568

48 pp

Avail NTIS

1978

**Stratospheric Warmings: Synoptic, Dynamic and General-Circulation Aspects**

*R. M. McInturff*

Distinction between major and minor warmings, the importance of tropospheric-stratospheric interaction, the significance of the pressure-work term near the tropopause.

NASA RP-1017

N78-18630

173 pp

Avail NTIS

1978

**Guide to a Condensed Form of NASTRAN**

*J. L. Rogers, Jr.*

Limited capability form of NASTRAN level 16 to meet the needs of universities and small consulting firms. Can serve as a handbook for instructional courses in the use of NASTRAN or for users who need only the capability provided by the condensed form.

NASA RP-1019

N78-33791

297 pp

Avail NTIS

1978

**Precision Positional Data of General Aviation Air Traffic in Terminal Air Space**

*W. E. Melson, Jr., L. C. Parker, A. M. Northam, et al.*

Three-dimensional radar tracks of general aviation air traffic at three uncontrolled airports.

NASA RP-1020

N78-25048

13 pp

Avail NTIS

1978

**A Bibliography on the Search for Extraterrestrial Intelligence**

*E. F. Mallove, M. M. Connors, R. L. Forward, et al.*

A uniform compilation of works dealing with the search for extraterrestrial intelligence.

NASA RP-1021

N78-21019

135 pp

Avail NTIS

1978



**Man's Impact on the Troposphere:  
Lectures in Tropospheric Chemistry**

*J. S. Levine, D. R. Schryer*

Lectures covering a broad spectrum of current research in tropospheric chemistry, with particular emphasis on the interaction of measurements, modeling, and understanding of fundamental processes.

NASA RP-1022

N79-10634

371 pp

Avail NTIS

1978

**Synoptic Analyses, 5-, 2-, and  
0.4-Millibar Surfaces for July 1974  
Through June 1976**

Meteorological rocketsonde and satellite radiance data employed for analyses of a continuing series of high altitude constant pressure charts.

NASA RP-1023

N78-28748

330 pp

Avail NTIS

1978

**Anthropometric Source Book**

*E. Churchill, L. L. Laubach,  
J. T. McConville, et al.*

Volume 1. Anthropometry for Designers. Application of anthropometry to design of clothing, equipment, and workspaces for manned space flight.

NASA RP-1024

N79-11734

603 pp

Avail NTIS

1978

Volume 2. A Handbook of Anthropometric Data. Data from surveys of 61 populations; 295 measured variables.

NASA RP-1024

N79-13711

428 pp

Avail NTIS

1978

Volume 3. Annotated Bibliography of Anthropometry

NASA RP-1024

N79-13712

130 pp

Avail NTIS

1978

**Handbook on Astronaut Crew Motion  
Disturbances for Control System Design  
in Skylab**

*M. C. Kulas*

The analyses and results pertinent to the characterization of the disturbances imparted to the Skylab vehicle by the T-013 crew motion experiments.

NASA RP-1025

N79-27237

196 pp

Avail NTIS

1979

**An Assessment of the Effect of Super-  
sonic Aircraft Operations on the  
Stratospheric Ozone Content**

*I. G. Poppoff, R. C. Whitten,  
R. P. Turco, et al.*

An assessment of the potential effect on stratospheric ozone of an advanced supersonic transport operation using the most recent chemical reaction rate data.

NASA RP-1026

N78-30774

60 pp

Avail NTIS

1978

**A New Dimension. Wallops Island  
Flight Test Range: The First Fifteen  
Years**

*J. A. Shortal*

A record of the first fifteen years (1945-1959) of research and development tests that were performed at Wallops Island.

NASA RP-1028

N79-20166

784 pp

Avail NTIS

1978

**The PR2D (Place, Route in 2-Dimen-  
sions) Automatic Layout Computer  
Program Handbook**

*T. M. Edge*

NASA RP-1029

N79-71512

256 pp

Avail NIAC

1978

**Molecules of Significance in Planetary  
Aeronomy**

*H. Mohan*

Spectroscopic information of the molecules of planetary interest. General conditions of planets and their atmospheres including the gaseous molecules.

NASA RP-1030

N79-22980

318 pp

Avail NTIS

1979

**Catalog of Far-Ultraviolet Objective-  
Prism Spectrophotometry: Skylab  
Experiment S-019, Ultraviolet Stellar  
Astronomy**

*K. G. Henize, J. D. Wray,  
S. B. Parsons, et al.*

Approximately 1000 spectra representing 500 stars were measured and reduced to observed fluxes. Spectrophotometric results are tabulated for these 500 stars.

NASA RP-1031

N79-27057

545 pp

Avail NTIS

1979

**Synoptic Analyses, 5-, 2-, 1-, and 0.4-Millibar Surfaces for July 1976 Through June 1977**

Meteorological rocketsonde and satellite radiance data employed for analyses of a continuing series of high-altitude constant-pressure charts.

NASA RP-1032

N79-19569

226 pp

Avail NTIS

1978

**Convective Rainfall Estimation From Digital GOES-1 Infrared Data**

*G. L. Sickler, A. H. Thompson*

An investigation to determine the feasibility of developing an objective technique for estimating convective rainfall from digital GOES-1 infrared data.

NASA RP-1034

N79-31885

96 pp

Avail NTIS

1979

**Survey and Bibliography on Attainment of Laminar Flow Control in Air Using Pressure Gradient and Suction**

*D. M. Bushnell, M. H. Tuttle*

The survey, summaries of data for both ground and flight experiments, and abstracts of referenced reports.

NASA RP-1035

N79-33438

346 pp

Avail NTIS

1979

**ALSEP Termination Report**

*J. R. Bates, W. W. Lauderdale, H. Kernaghan*

Description of experiments and pertinent operational history, data processing and distribution, significant scientific findings.

NASA RP-1036

N79-22979

161 pp

Avail NTIS

1979

**Collisionless Galaxy Simulations**

*F. Hohl, T. A. Zang, J. B. Miller*

Computer experiments performed to determine the collapse and relaxation of initially spherical, uniform density and uniform velocity dispersion stellar systems.

NASA RP-1037

N79-24921

149 pp

Avail NTIS

1979

**Review and Status of Liquid-Cooling Technology for Gas Turbines**

*G. J. Vanfossen, Jr., F. S. Stepka*

Liquid-cooled systems and methods, assessment of the current technology status and requirements, comprehensive bibliography.

NASA RP-1038

N79-22427

31 pp

Avail NTIS

1979

**Synthetic Aperture Radar/Landsat MSS Image Registration**

*H. E. Maurer, J. D. Oberholtzer, P. E. Anuta*

Algorithms and procedures necessary to merge aircraft synthetic aperture radar (SAR) and Landsat multispectral scanner (MSS) imagery, design of a SAR/Landsat data merging system.

NASA RP-1039

N80-16405

233 pp

Avail NTIS

1979

**NASA JSC Water Monitor System: City of Houston Field Demonstration**

*R. E. Taylor, E. L. Jeffers, D. H. Fricks*

A water quality monitoring system with on-line and real time operation similar to the function in a spacecraft was investigated. Two major points were demonstrated: (1) the water monitor system has great potential in water monitoring and/or process control applications; and (2) the water monitor system represents a vast improvement over conventional (grab sample) water monitoring techniques.

NASA RP-1041

N79-28062

57 pp

Avail NTIS

1979

**Performance Evaluation Method for Dissimilar Aircraft Design Using the Square of the Wing Span for Non-dimensional Comparisons of Aerodynamic Characteristics**

*H. J. Walker*

A rationale for using the square of the wing-span rather than the wing reference area as a basis for nondimensional comparisons of the aerodynamic and performance characteristics of aircraft that differ substantially in platform and loading.

NASA RP-1042

N79-30139

72 pp

Avail NTIS

1979

**Processing of On-Board Recorded Data for Quick Analysis of Aircraft Performance—Rotor Systems Research Aircraft**

*N. H. Michaud*

A system of independent computer programs for the processing of digitized pulse code modulated and frequency modulated data.

NASA RP-1043

N79-33191

326 pp

Avail NTIS

1979

### Wind Study for High Altitude Platform Design

*T. W. Strganac*

An analysis of upper air winds to define the wind environment at potential operating altitudes for high altitude powered platform concepts.

NASA RP-1044

N80-12661

Avail NTIS

288 pp

1979

### The Physiological Basis for Spacecraft Environmental Limits

*J. M. Waligora*

Limits for operational environments in terms of acceptable physiological changes: contaminants, temperature, acceleration, noise, rf radiation, and weightlessness.

NASA RP-1045

N80-15788

Avail NTIS

229 pp

1979

### Measurement of Aircraft Speed and Altitude

*W. Gracey*

Problems involved in measuring speed and altitude with pressure-actuated instruments (altimeter, airspeed indicator, true-airspeed indicator, Machmeter, and vertical-speed indicator).

NASA RP-1046

N80-24296

Avail NTIS

311 pp

1980

### Measurement Techniques for Trace Metals in Coal-Plant Effluents: A Brief Review

*J. J. Singh*

The strong features and limitations of techniques for determining trace elements in aerosols emitted from coal plants.

NASA RP-1047

N79-33611

Avail NTIS

34 pp

1979

### Procedure for Extraction of Disparate Data From Maps Into Computer Data Bases

*B. G. Junkin*

A procedure for extracting disparate sources of data from geographic maps, and for the conversion of these data into a suitable format for processing on a computer-oriented information system.

NASA RP-1048

N79-33858

Avail NTIS

23 pp

1979

### The Stratosphere: Present and Future

*R. D. Hudson, E. J. Reed*

The three basic elements of stratospheric science-laboratory measurements, atmospheric observations, and theoretical studies.

NASA RP-1049

N80-14641

Avail NTIS

443 pp

1979

### Classical Aerodynamic Theory

*R. T. Jones*

Theories of incompressible potential flow and research on the aerodynamic forces on wing and wing sections of aircraft and on airship hulls.

NASA RP-1050

N80-15033

Avail NTIS

308 pp

1979

### Thermodynamic Properties of Nitrogen Gas Derived From Measurements of Sound Speed for Cryogenic Wind Tunnels

*B. Younglove, R. D. McCarty*

A virial equation of state for nitrogen was determined by use of newly measured speed-of-sound data and existing pressure-density-temperature data in a multiproperty-fitting technique.

NASA RP-1051

N80-14257

Avail NTIS

56 pp

1979

### Sealed-Cell Nickel-Cadmium Battery Applications Manual

*W. R. Scott, D. W. Rusta*

The design, procurement, testing, and application of aerospace quality, hermetically sealed nickel-cadmium cells and batteries.

NASA RP-1052

N80-16095

Avail NTIS

533 pp

1979

### Results of the August 1977 Soviet and American Meteorological Rocketsonde Intercomparison Held at Wallops Island, Virginia

*F. J. Schmidlin, J. R. Duke,*

*A. I. Ivanovsky, et al.*

A coordinated program of rocketsonde investigations along about 60° E and 70° W between the United States and U.S.S.R.

NASA RP-1053

N80-16682

Avail NTIS

193 pp

1980

**Thunderstorm-Environment Interactions Determined With Three-Dimensional Trajectories**

*G. S. Wilson*

Diagnostically determined three dimensional trajectories were used to reveal some of the scale interaction processes that occur between convective storms and their environment.

NASA RP-1054

N80-16675

Avail NTIS

163 pp

1980

**Some Human Factors Issues in the Development and Evaluation of Cockpit Alerting and Warning Systems**

*R. J. Randle, Jr., W. E. Larsen,  
D. H. Williams*

A set of general guidelines for evaluating newly developed cockpit alerting and warning system in terms of human factors issues.

NASA RP-1055

N80-15821

Avail NTIS

65 pp

1980

**Orbiter Landing Loads Math Model Description and Correlation With ALT Flight Data**

*D. A. Hamilton, J. A. Schliesing,  
G. A. Zupp, Jr.*

Results of the Space Shuttle approach and landing test to assess landing gear characteristics and performance and to verify landing dynamic analyses.

NASA RP-1056

N80-16091

Avail NTIS

27 pp

1980

**Handbook of Lunar Materials**

*R. J. Williams, J. J. Jadwick*

The physical, chemical, thermodynamic, and geologic data of lunar rocks, minerals, and processes.

NASA RP-1057

N80-16009

Avail NTIS

133 pp

1980

**Stratospheric Aerosol Modification by Supersonic Transport Operations With Climate Implications**

*O. B. Toon, R. P. Turco,  
J. B. Pollack, et al.*

The potential effects on stratospheric aerosols of supersonic transport emissions of sulfur dioxide gas and submicron size soot granules.

NASA RP-1058

N80-15726

Avail NTIS

20 pp

1980

## Conference Publications

### Proceedings of the SCAR Conference

Aerodynamics, stability and control, propulsion, environmental factor, airframe structures and materials, design integration.

#### Part 1

|            |        |
|------------|--------|
| NASA CP-1  |        |
| N77-17996  | 478 pp |
| Avail NTIS | 1976   |

#### Part 2

|            |        |
|------------|--------|
| NASA CP-1  |        |
| N77-18019  | 547 pp |
| Avail NTIS | 1976   |

### The Structure and Content of the Galaxy and Galactic Gamma Rays

*C. E. Fichtel, F. W. Stecker*

Gamma radiation investigations by COS-B and SAS-2 satellites, data from CO surveys of the galaxy and the galactic distribution of pulsars, theories of galactic gamma ray emission.

|            |        |
|------------|--------|
| NASA CP-2  |        |
| N77-20977  | 356 pp |
| Avail NTIS | 1977   |

### Systems Reliability Issues for Future Aircraft

Reliability of adaptive controls for future aircraft.

|            |        |
|------------|--------|
| NASA CP-3  |        |
| N77-22808  | 212 pp |
| Avail NTIS | 1975   |

### Inversion Methods in Atmospheric Remote Sounding

*A. Deepak*

The mathematical theory of inversion methods applied to the remote sounding of atmospheric temperature, humidity, and aerosol constituents.

|            |        |
|------------|--------|
| NASA CP-4  |        |
| N78-12586  | 609 pp |
| Avail NTIS | 1977   |

### The Use of Nonhuman Primates in Space

*R. C. Simmonds, G. H. Bourne*

Space related biomedical research involving nonhuman primates. Conference, December 1974.

|            |        |
|------------|--------|
| NASA CP-5  |        |
| N78-11663  | 390 pp |
| Avail NTIS | 1977   |

### Application of Remote Sensing to the Chesapeake Bay Region

*W. T. Chen, G. W. Freas, Jr.,  
G. D. Hickman, et al.*

#### Part 1. Executive Summary

|            |       |
|------------|-------|
| NASA CP-6  |       |
| N78-23537  | 47 pp |
| Avail NTIS | 1978  |

#### Part 2. Proceedings

|            |        |
|------------|--------|
| NASA CP-6  |        |
| N78-21526  | 388 pp |
| Avail NTIS | 1978   |

### Fourth NASA Inter-Center Control Systems Conference

Space vehicle control applications; aircraft guidance, control, and handling qualities. Conference, November 1969.

|            |        |
|------------|--------|
| NASA CP-7  |        |
| N78-23010  | 504 pp |
| Avail NTIS | 1978   |

### Advances in Engineering Science

Volume 1. Materials science, fracture mechanics, impact and vibration testing.

|              |        |
|--------------|--------|
| NASA CP-2001 |        |
| N77-10230    | 360 pp |
| Avail NTIS   | 1976   |

Volume 2. Structural dynamics.

|              |        |
|--------------|--------|
| NASA CP-2001 |        |
| N77-10265    | 457 pp |
| Avail NTIS   | 1976   |

Volume 3. Acoustics, environmental modeling, energy technology.

|              |        |
|--------------|--------|
| NASA CP-2001 |        |
| N77-10305    | 464 pp |
| Avail NTIS   | 1976   |

Volume 4. Inviscid flow, viscous flow, aircraft aerodynamics, fluid mechanics, propulsion and combustion, flight dynamics and control.

|              |        |
|--------------|--------|
| NASA CP-2001 |        |
| N77-10345    | 521 pp |
| Avail NTIS   | 1976   |

### Flight Mechanics/Estimation Theory Symposium

*A. Fuchs*

Computation of relative motion, rapid satellite life-time estimation, mission analysis system design, satellite attitude prediction.

|                 |        |
|-----------------|--------|
| NASA CP-2002    |        |
| N78-76855       | 265 pp |
| Avail NASA LERC | 1975   |

### Free Drifting Buoys

Tracking systems and techniques; deployment and retrieval; simulation, sensors, and data; recent experience and plans.

NASA CP-2003

N77-16675 378 pp

Avail NTIS 1974

### Atmospheric Aerosols: Their Optical Properties and Effects

Computations based on thermodynamic equilibrium and Mie theory.

NASA CP-2004

N77-15563 316 pp

Avail NTIS 1976

Supplement. Digest of technical papers.

NASA CP-2004

N77-15564 46 pp

Avail NTIS 1976

### Aircraft Piston Engine Exhaust Emission Symposium

Emission measurement problems, data reduction procedures, flight testing, emission reduction techniques.

NASA CP-2005

N77-17081 373 pp

Avail NTIS 1976

### Proceedings and Findings of 1976 Workshop on Ride Quality—Passenger Acceptance of Transportation Systems

*A. R. Kublthau*

NASA CP-2006

N77-27710 86 pp

Avail NTIS 1976

### Ninth Conference on Space Simulation

Spacecraft testing; facilities and test equipment; system and subsystem test; life sciences, medicine, and space; physical environmental factors; chemical environmental factors; contamination; space physics; thermal protection.

NASA CP-2007

N79-19013 470 pp

Avail NTIS 1977

### High Reynolds Number Research

*D. D. Baals*

Fundamental aerodynamics questions for which high Reynolds number experimental capability is required; design features of the NASA Langley Transonic Facility.

NASA CP-2009

N77-27139 185 pp

Avail NTIS 1977

### Terrestrial Photovoltaic Measurements

Terrestrial solar irradiance, solar simulation and reference cell calibration, cell and array measurement procedures.

NASA CP-2010

N77-30521 393 pp

Avail NTIS 1976

### Proceedings of the 1977 MACSYMA Users' Conference

Technical aspects of MACSYMA, a large symbolic and algebraic system.

NASA CP-2012

N77-28750 596 pp

Avail NTIS 1977

### Summary Report: Workshop on Vehicle Ride Quality

*A. R. Kublthau, A. W. Wichansky*

Procedures to optimize urban transportation with emphasis on vehicle ride quality. Workshop, August 1975.

NASA CP-2013

N78-11705 167 pp

Avail NTIS 1977

### Essays on the History of Rocketry and Astronautics: Proceedings of the Third Through the Sixth History Symposia of the International Academy of Astronautics

*R. C. Hall*

Early solid propellant rocketry, rocketry and astronautics after 1880, development of liquid and solid propellant rockets from 1880 to 1945, rocketry and astronautics after 1945. Symposia, October 1969, October 1970, September 1971, October 1972.

Volume 1

NASA CP-2014

N77-33030 244 pp

Avail GPO 1977

Volume 2

NASA CP-2014

N77-33048 476 pp

Avail GPO 1977

### Standardization, Certification, Maintenance, and Dissemination of Large-Scale Engineering Software Systems

*T. G. Toridis, H. G. McComb, Jr., K. Khozeimeh*

NASA CP-2015

N77-33876 103 pp

Avail NTIS 1977

### **Lean Premixed/Prevaporized Combustion**

*A. H. Lefebvre*

Recommendations on the status and application of lean premixed/prevaporized combustion to the aircraft gas turbine for the reduction of pollutant emissions.

NASA CP-2016

N77-33297

Avail NTIS

46 pp

1977

### **An Assessment of Technology for Turbojet Engine Rotor Failures**

*E. A. Witmer*

Design considerations, objectives, and approaches in containing rotor burst debris; methods for determining the fracture resistance of various materials used in providing lightweight shielding from fragment impact.

NASA CP-2017

N78-10068

Avail NTIS

425 pp

1977

### **Sixth NASTRAN Users' Colloquium**

NASTRAN programming and substructuring methods, fluids and thermal applications.

NASA CP-2018

N78-12443

Avail NTIS

473 pp

1977

### **Proceedings of the ASPE/MSFC Symposium on Engineering and Productivity Gains From Space Technology**

Aerospace technology findings in regard to nonaerospace applications, energy generation, materials and processes, Earth observation, advances and benefits of electronics.

NASA CP-2019

N77-30273

Avail NTIS

279 pp

1977

### **Solar Cell High Efficiency and Radiation Damage**

Silicon solar cell analysis and fundamental measurements, silicon cell technology, gallium arsenide research and technology, radiation effects on silicon and gallium arsenide cells.

NASA CP-2020

N78-13527

Avail NTIS

221 pp

1977

### **Aircraft Engine Emissions**

Components, controls, energy efficient engine designs, noise and pollution reduction.

NASA CP-2021

N78-11063

Avail NTIS

452 pp

1977

### **NASA Workshop on Solar-Terrestrial Studies From a Manned Space Station**

The mechanism of the solar radiation and its effect on the environment, instrumentation requirements in the exploration of the solar and terrestrial system.

NASA CP-2024

N77-32549

Avail NTIS

42 pp

1977

### **Agricultural Aviation Research**

*H. L. Chevalier, L. F. Bouse*

The current state of the art of agricultural aviation, potentially productive short and long range research and development areas, communications between research scientists and engineers involved in agricultural research.

NASA CP-2025

N78-12999

Avail NTIS

151 pp

1977

### **AIAA/MSFC Symposium on Space Industrialization: Proceedings**

Current and projected technologies required for utilizing extraterrestrial environments to produce energy, information, or materials and provide services of value on Earth or to Earth.

NASA CP-2026

N78-18088

Avail NTIS

627 pp

1976

### **Proceedings of the 1977 NASA/ISHM Microelectronics Conference**

*S. V. Caruso*

Current and future requirements for research development, manufacturing, and education in the field of hybrid microelectronic technology.

NASA CP-2027

N78-16266

Avail NTIS

170 pp

1977

### **Proceedings of the First Annual Meteorological and Environmental Inputs to Aviation Systems Workshop**

*D. W. Camp, W. Frost*

Aircraft design, simulation, and general aviation.

NASA CP-2028

N78-19711

Avail NTIS

335 pp

1977

### Third National Aeronautics and Space Administration Weather and Climate Program Science Review

*E. R. Kreins*

Research results of developing experimental and prototype operational systems, sensors, and space facilities for monitoring and understanding the atmosphere.

NASA CP-2029  
N79-20575 304 pp  
Avail NTIS 1977

### Active Microwave Users Workshop Report

*R. E. Matthews*

Seasat land experiments, program planning, synthetic aperture radar data processing, applications.

NASA CP-2030  
N78-21562 300 pp  
Avail NTIS 1978

### Summer Workshop on Near-Earth Resources

*J. R. Arnold, M. B. Duke*

The possible large scale use of extraterrestrial resources to construct structures in space or to return to Earth as supplements for terrestrial resources.

NASA CP-2031  
N78-16973 107 pp  
Avail NTIS 1978

### Future Computer Requirements for Computational Aerodynamics

Recent advances in computational aerodynamics, potential benefits of a national aerodynamic simulation facility.

NASA CP-2032  
N78-19778 515 pp  
Avail NTIS 1978

### Jet Aircraft Hydrocarbon Fuels Technology

*J. P. Longwell*

Prediction of tradeoffs among fuel refining, distribution, and aircraft operating costs; combustor liner temperature and emissions studies; and practical simulator investigations of the effect of high freezing point and low thermal stability fuels on aircraft fuel systems.

NASA CP-2033  
N78-19325 64 pp  
Avail NTIS 1978

### Wind Turbine Structural Dynamics

*D. R. Miller*

Methods for calculating dynamic loads, aeroelasticity stability, wind loads, both steady and transient, critical design conditions, drive train dynamics, behavior of operating wind turbines.

NASA CP-2034  
N78-19616 280 pp  
Avail NTIS 1978

### Large Space Systems Technology

*E. C. Naumann, A. Butterfield*

Mission requirements, structural concepts, materials, structural alignment, thermal control, metrology, technological forecasting.

#### Volume 1

NASA CP-2035  
N79-10078 540 pp  
Avail NTIS 1978

#### Volume 2

NASA CP-2035  
N79-10097 505 pp  
Avail NTIS 1978

### CTOL Transport Technology, 1978

Part 1. Aircraft propulsion, structures and materials, laminar flow control.

NASA CP-2036  
N78-27046 516 pp  
Avail NTIS 1978

Part 2. Advanced aerodynamics and active controls, operations, and safety, advanced systems, energy efficiency.

NASA CP-2036  
N78-29046 405 pp  
Avail NTIS 1978

### Guntersville Workshop on Solar-Terrestrial Studies

The effects of solar activity on geomagnetic activity; instrument requirements for interdisciplinary joint observational studies of the magnetosphere, the atmosphere, Sun-weather relationships.

NASA CP-2037  
N78-19600 71 pp  
Avail NTIS 1977

### The 11th Aerospace Mechanisms Symposium

Spacecraft and missile components such as tail assemblies, radiometers, magnetometers.

NASA CP-2038  
N79-21374 243 pp  
Avail NTIS 1977



**Proceedings of the USAF/NASA International Spacecraft Contamination Conference**

*J. M. Jemiola*

Spacecraft modeling, determination of basic material properties, thruster plume characteristics and modeling, contamination prevention and control, contamination kinetics and effects.

NASA CP-2039

N79-25048 1219 pp

Avail NTIS 1978

**The MSFC/UAH Data Management Symposium**

*A. Castelli*

NASA CP-2040

N78-74659 423 pp

Avail NTIS 1978

**The 1977 Goddard Space Flight Center Battery Workshop**

Results of testing, analysis, and development of the sealed nickel cadmium cell system.

NASA CP-2041

N79-21565 579 pp

Avail NTIS 1977

**Emerging Energy Alternatives for the Southeastern States**

*E. K. Stefanakos*

Solar energy, wood energy, novel energy sources, agricultural and industrial process heat, waste utilization, energy conservation, ocean thermal energy conversion.

NASA CP-2042

N78-28615 149 pp

Avail NTIS 1978

**Stratcom 8 Data Workshop and Supplement**

*E. L. Reed*

The study of stratospheric photochemistry involving ozone, with secondary objectives including a study of the balloon environment, comparison of independent techniques for the measurement of O<sub>3</sub> and NO, development of new sensor systems.

NASA CP-2043

N79-23461 137 pp

Avail NTIS 1978

**Planning for Airport Access: An Analysis of the San Francisco Bay Area**

*J. S. Dajani, J. V. Jucker, J. L. Jones*

A description of the airport area, its current transportation capabilities, recommendations for future access planning.

NASA CP-2044

N79-10942 300 pp

Avail NTIS 1978

**Advanced Technology Airfoil Research**

Comprehensive review of airfoil research; development of computational aerodynamic codes for airfoil analysis and design, development of experimental facilities and test techniques, airfoil applications.

Volume 1, Part 1

NASA CP-2045

N79-20030 454 pp

Avail NTIS 1979

Volume 1, Part 2

NASA CP-2045

N79-19989 303 pp

Avail NTIS 1978

Volume 2

NASA CP-2046

N80-21283 262 pp

Avail NTIS 1979

**Research Efforts in Aircraft Pollution**

Emissions regulations, combustor modeling, combustor development, instrumentation, emission measurement, airport/airbase pollution, upper atmospheric pollution and chemistry.

NASA CP-2048

X78-10171 124 pp

1978

**Proceedings of the NASA/Florida Institute of Technology Environmental Engineering Conference on Nitrogen Tetroxide With Emphasis on Space Shuttle**

*E. L. Rhodes*

Methods of reducing the user hazards of nitrogen tetroxide, Kennedy Space Center developments in N<sub>2</sub>O<sub>4</sub> control for the Space Shuttle, life support equipment and transportation.

NASA CP-2049

N79-20424 203 pp

Avail NTIS 1978

### **Flight Mechanics/Estimation Theory Symposium**

Satellite attitude determination and control, orbit determination, onboard and ground attitude determination procedures, effect of atmosphere on Venus orbiter navigation, satellite-to-satellite tracking, satellite on-board navigation using global positioning system data.

NASA CP-2050  
N79-14121 289 pp  
Avail NTIS 1978

### **Hyperthermia as an Antineoplastic Treatment Modality**

*S. A. T. Long, J. Shaeffer,  
A. M. El-Mahdi*

Preclinical evaluation of hyperthermia for treating tumorous cancers.

NASA CP-2051  
N79-10728 96 pp  
Avail NTIS 1978

### **Helicopter Acoustics**

Noise regulation concepts, design, operations and testing for noise control, helicopter noise prediction, research tools and measurements.

#### **Part 1**

NASA CP-2052  
N78-32816 399 pp  
Avail NTIS 1978

#### **Part 2**

NASA CP-2052  
N79-10843 438 pp  
Avail NTIS 1978

### **Asteroids: An Exploration Assessment**

*D. Morrison, W. C. Wells*

Current state of asteroid science, need for future space missions to gain more knowledge on asteroid relationship to solar system formation.

NASA CP-2053  
N78-29007 295 pp  
Avail NTIS 1978

### **YF-12 Experiment Symposium, Volume 1**

Propulsion system performance, inlet time varying distortion, structures, aircraft controls, propulsion controls, and aerodynamics.

NASA CP-2054  
N78-32055 286 pp  
Avail NTIS 1978

### **YF-12 Experiments Symposium, Volume 2**

NASA CP-2054 126 pp  
1978

### **YF-12 Experiments Symposium, Volume 3**

NASA CP-2054 542 pp  
1978

### **Engineering and Scientific Data Management**

The application of data management systems to engineering and scientific data.

NASA CP-2055  
N78-33776 255 pp  
Avail NTIS 1978

### **Exploratory Meeting on Atmospheric Electricity and Severe Storms**

*W. W. Vaughan*

Atmospheric electricity and its relationship to severe storms, the feasibility of developing a set of instruments for either a Space Shuttle or an unmanned satellite, the scientific rationale which would warrant further in-depth assessment, involvement and development of supporting activities by NASA.

NASA CP-2056  
N78-29669 30 pp  
Avail NTIS 1978

### **Proceedings of the 2nd Annual Workshop on Meteorological and Environmental Inputs to Aviation Systems**

*W. Frost, D. W. Camp, D. E. Durham*

The major objectives of the workshop were to satisfy such needs of the sponsoring agencies as the expansion of understanding and knowledge of the interactions of the atmosphere with aviation systems, the better definition and implementation of services to operators, and the collection and interpretation of data for establishing operational criteria.

NASA CP-2057  
N79-17413 259 pp  
Avail NTIS 1978

### **Future Orbital Power Systems Technology Requirements**

Comment on current and planned programs and opportunities for technology investment.

NASA CP-2058  
N79-10122 195 pp  
Avail NTIS 1978

### Research in Computerized Structural Analysis and Synthesis

*H. G. McComb, Jr.*

Computer applications in dynamic structural analysis and structural design modeling.

NASA CP-2059

N79-10448

224 pp

Avail NTIS

1978

### The 14th Annual Conference on Manual Control: Digital Simulation of Human Operator Dynamics

Human operator dynamics during actual manual control or while monitoring the automatic control systems involved in air-to-air tracking, automobile driving, the operator of undersea vehicles, remote handling.

NASA CP-2060

N79-15598

692 pp

Avail NTIS

1978

### Avionics and Controls Research and Technology

*H. A. Rediess, D. E. McIver*

Technology needs and opportunities, the role of NASA in avionics and controls research.

NASA CP-2061

N79-15898

84 pp

Avail NTIS

1979

### Seventh NASTRAN User's Colloquium

Fluids and thermal applications, NASTRAN programming, substructuring methods, unique new applications, general auxiliary programs, specific applications, new capabilities.

NASA CP-2062

N78-32466

499 pp

Avail NTIS

1978

### Human Neurological Development: Past, Present and Future

*R. Pelligra*

Vision; vestibular function; intelligence; nutrition; treatment of neurological disfunctions, coma, and convulsive seizures.

NASA CP-2063

N79-15887

60 pp

Avail NTIS

1978

### Tools for Embedded Computing Systems Software

Tools and the software environment; tools and software requirements, design, and specification; tools and language processors; tools and verification and validation.

NASA CP-2064

N79-13736

137 pp

Avail NTIS

1978

### Recent Advances in Structures for Hypersonic Flight

Engine structures, cooled airframe structures, hot structures, thermal protection systems, cryogenic tankage structures, cryogenic insulation, analysis of thermal structures.

Part 1

NASA CP-2065

N79-21422

533 pp

Avail NTIS

1978

Part 2

NASA CP-2065

N79-21435

408 pp

Avail NTIS

1978

### Ozone Contamination in Aircraft Cabins

The problem and solution to the physical ozone irritation caused by ozone concentrations in the cabins of high-altitude aircraft.

NASA CP-2066

N79-21021

81 pp

Avail NTIS

1979

### The Rotary Engine: A Candidate for General Aviation

Nonturbine engine research programs for general aviation, future requirements for general aviation powerplants.

NASA CP-2067

N79-15961

190 pp

Avail NTIS

1978

### The Saturn System

*D. M. Hunten, D. Morrison*

Mission planning for orbiter and entry probes of the Saturn system emphasizes scientific studies of Saturn, its satellites, its rings, and its magnetosphere.

NASA CP-2068

N79-16758

423 pp

Avail NTIS

1978

### Proceedings of the Workshop on an Electromagnetic Positioning System in Space

*W. A. Oran*

Study of metallic glasses, investigations of the properties of high temperature materials.

NASA CP-2069

N79-13069

25 pp

Avail NTIS

1978

### Radar, Insect Population Ecology, and Pest Management

*C. R. Vaughn, W. Wolf, W. Klassen*

The potential role of radar in insect ecology studies and pest management and phenomena with insect movement.

NASA CP-2070

N79-19592

252 pp

Avail NTIS

1979

### Spacecraft Charging Technology, 1978

The interaction of the aerospace environment with spacecraft surfaces and onboard, high voltage spacecraft systems operating over a wide range of altitudes from low Earth orbit to geosynchronous orbit.

NASA CP-2071  
N79-24001 908 pp  
Avail NTIS 1979

### Second International Colloquium on Mars: Abstracts for a Colloquium

NASA CP-2072  
N79-16757 97 pp  
Avail NTIS 1979

### Soil Moisture Workshop

*J. L. Heilman, D. G. Moore,  
T. J. Schmugge, et al.*

The objectives of the workshop were to evaluate the state of the art of remote sensing of soil moisture, examine the needs of potential users, and make recommendations concerning the future of soil moisture research and development.

NASA CP-2073  
N79-16329 219 pp  
Avail NTIS 1978

### Carbon Fiber Risk Analysis

The scope and status of the effort to assess the risks associated with the accidental release of carbon/graphite fibers from civil aircraft.

NASA CP-2074  
N79-22196 245 pp  
Avail NTIS 1979

### Government/Industry Workshop on Payload Loads Technology

The problems of balancing the design criteria between launch and orbit operations and developing analytical techniques that are reliable, accurate, efficient, and low cost.

NASA CP-2075  
N79-20162 874 pp  
Avail NTIS 1978

### Fourth National Aeronautics and Space Administration Weather and Climate Program Science Review

*E. R. Kreins*

Scientific research on severe storms and local weather, global weather, and climate.

NASA CP-2076  
N79-20633 396 pp  
Avail NTIS 1979

### Quiet Powered-Lift Propulsion

New propulsion technology for powered-lift aircraft systems.

NASA CP-2077  
N80-15127 426 pp  
Avail NTIS 1979

### Premixed Prevaporized Combustor Technology Forum

Engine interfaces, fuel-air preparation, autoignition, lean combustion, concept design studies.

NASA CP-2078  
N79-24994 262 pp  
Avail NTIS 1979

### Graphite/Polyimide Composites: Conference on Composites for Advanced Space Transportation Systems

*H. B. Dexter, J. G. Davis, Jr.*

Fabrication, adhesives, test methods, structural integrity, design and analysis, advanced technology developments, high temperature polymer research, the state of the art of graphite/polyimide composites.

NASA CP-2079  
N79-30297 449 pp  
Avail NTIS 1979

### The 12th Aerospace Mechanisms Symposium

Boom release mechanisms, separation on Space Shuttle orbiter/Boeing 747 aircraft, payload handling, spaceborne platform support, deployment of spaceborne antennas and telescopes.

NASA CP-2080  
N79-21352 241 pp  
Avail NTIS 1979

### The 13th Aerospace Mechanisms Symposium

*A. C. Bond*

Propulsion; motion compensation; instrument pointing and adjustment; centrifuge testing; bearing design; vehicle braking; cargo handling; devices for satellite, missile, and hypersonic-wind-tunnel applications; space shuttle mechanical and thermal protection systems; techniques for building large space structures.

NASA CP-2081  
N79-22539 300 pp  
Avail NTIS 1979

**Flight Mechanics/Estimation Theory Symposium With Application to Autonomous Navigation and Attitude/Orbit Determination**

*A. J. Fuchs*

Landsat landmark data, star sensing and pattern recognition, filtering algorithms for global positioning system, determining orbital elements for geostationary satellites.

NASA CP-2082

N79-26082

Avail NTIS

347 pp

1979

**Laser Doppler Velocimetry Workshop**

*R. B. Owen*

The potential of laser Doppler velocimetry as a technique for use in mapping flows in the several fluid systems under development for doing research on low-gravity processes.

NASA CP-2084

N79-22455

Avail NTIS

12 pp

1979

**The Science and Technology of Low Speed and Motorless Flight**

*P. W. Hanson*

Low speed aerodynamics, new materials applications and structural concepts, advanced flight instrumentation, sailplane optimal flight techniques, self-launching and ultralight glider technology.

Part 1

NASA CP-2085

N79-23889

Avail NTIS

299 pp

1979

Part 2

NASA CP-2085

N79-27070

Avail NTIS

297 pp

1979

**Aircraft Icing**

*B. J. Blaha*

NASA CP-2086

N79-23912

Avail NTIS

147 pp

1979

**Fundamentals of Gas Turbine Combustion**

*M. Gerstein*

Atomization and vaporization, combustion chemistry, combustion dynamics, combustion modeling.

NASA CP-2087

N79-25016

Avail NTIS

52 pp

1979

**The 11th Annual Battery Workshop**

The development, properties, and testing of nickel cadmium, metal hydrogen, and lithium systems.

NASA CP-2088

N79-28669

Avail NTIS

545 pp

1978

**Space Missions to Comets**

*M. Neugebauer, D. K. Yeomans, J. C. Brandt, et al.*

The broad impact of a cometary mission with particular emphasis on scientific interest in a fly-by mission to Halley's comet and a rendezvous with Tempel 2.

NASA CP-2089

N80-11972

Avail NTIS

229 pp

1979

**Middle Atmosphere Electrodynamics: Report of the Workshop on the Role of the Electrodynamics of the Middle Atmosphere on Solar Terrestrial Coupling**

*N. C. Maynard*

Review of the status of middle atmosphere electrodynamics and recommendations for future research.

NASA CP-2090

N79-25608

Avail NTIS

268 pp

1979

**Proceedings of Workshops to Define Engineering Requirements for a Space Vacuum Research Facility**

*W. A. Oran, S. T. Wu, R. W. Hoffman*

The construction of a molecular wake shield for the Shuttle orbiter, a collision model with a program depicting emitted molecular density around the spacecraft.

NASA CP-2091

N79-26076

Avail NTIS

152 pp

1979

**Aeropropulsion 1979**

State-of-the-art technology in aeronautical propulsion noise and air pollution control techniques, advances in supersonic propulsion for transport aircraft, composite materials and structures for reliable engine components, engine design for improved fuel consumption.

NASA CP-2092

N80-10205

Avail NTIS

464 pp

1979

### **Workshop on Thrust Augmenting Ejectors**

*A. E. Lopez, D. G. Koenig,  
D. S. Green, et al.*

The state of the art of ejector technology and the direction of future studies.

NASA CP-2093  
N80-10107 509 pp  
Avail NTIS 1979

### **Conference on Fire Resistant Materials: A Compilation of Presentations and Papers**

*D. A. Kourtidis, G. A. Johnson*

Large-scale testing, fire toxicology, polymeric materials, fire modeling.

NASA CP-2094  
N79-31166 287 pp  
Avail NTIS 1979

### **Proceedings: Workshop on the Need for Lightning Observations From Space**

*L. S. Christensen, W. Frost,  
W. W. Vaughan*

Satellite instrumentation specifically designed for indicating the characteristics of lightning are of value in severe storms research, in engineering and operational problem areas, and in providing information on atmospheric electricity and its role in meteorological processes.

NASA CP-2095  
N79-30869 255 pp  
Avail NTIS 1979

### **Implications of Fuel-Efficient Vehicles on Ride Quality and Passenger Acceptance**

*A. M. Wichansky, A. R. Kuhlthau*

Ride quality and passenger acceptance problems associated with enhanced fuel efficiency of automobiles and aircraft, shifts in intermediate range (100-500 miles) travel from automobiles to public transit.

NASA CP-2096  
N80-18990 120 pp  
Avail NTIS 1979

### **Solar Cell High Efficiency and Radiation Damage, 1979**

Progress in the effort to increase the end-of-life efficiency of solar cells for space use, silicon solar cell efficiency, radiation effects, gallium arsenide cells.

NASA CP-2097  
N79-32640 290 pp  
Avail NTIS 1979

### **Study of the Solar Cycle From Space**

The objectives of and benefits to be derived from a program of solar cycle research, the role of space observations, including crucial missions, experiments, and the theoretical advances.

NASA CP-2098  
N80-17944 366 pp  
Avail NTIS 1980

### **Earth Radiation Budget Science**

Climate modeling, climate diagnostics, radiation modeling, radiation variability and correlation studies, cloudiness and the radiation budget, and radiation budget and related measurements in 1985 and beyond.

NASA CP-2100  
N79-32797 79 pp  
Avail NTIS 1978

### **Flight Technology Improvement—Spaceborne Optical Radiometric Instruments, Attitude Control, and Electro-mechanical and Power Subsystems**

Optical radiometric instruments and calibration, attitude control and determination, electromechanical and power subsystem.

NASA CP-2101  
N80-13152 76 pp  
Avail NTIS 1979

### **Conference of Remote Sensing Educators (CORSE-78)**

Methods of improving the teaching of remote sensing, Earth resources, image interpretation, data processing concepts.

NASA CP-2102  
N80-20003 664 pp  
Avail NTIS 1978

### **Models of Human Operators in Vision Dependent Tasks**

*M. C. Waller*

Descriptive overviews of some existing models, and techniques of modeling the human operator.

NASA CP-2103  
N79-33838 86 pp  
Avail NTIS 1979

### **Proceedings: Third Annual Workshop on Meteorological and Environmental Inputs to Aviation Systems**

*D. W. Camp, W. Frost*

Training, flight operations, accident investigation, air traffic control, airports, winds and wind shear, icing and frost, atmospheric electricity and lightning, fog, visibility, ceilings, turbulence.

NASA CP-2104  
N80-14633 190 pp  
Avail NTIS 1979

**Summary of the NASA/MSFC FY-79  
Severe Storm and Local Weather  
Research Review—Cloud Physics,  
Atmospheric Electricity, and  
Mesoscale/Storm Dynamics Research**

NASA CP-2105  
N79-33722 92 pp  
Avail NTIS 1979

**Large Wind Turbine Design Character-  
istics and R&D Requirements**

*S. Lieblein*

Large wind turbine research and develop-  
ment.

NASA CP-2106  
N80-16453 459 pp  
Avail NTIS 1979

**Nuclear-Pumped Lasers—Efficient Con-  
version of Energy Liberated in Nuclear  
Reactions to Coherent Radiation**

Nuclear-pumped laser modeling, nuclear  
volume and foil excitation of laser plasmas,  
proton beam simulations, nuclear flashlamp  
excitation, reactor laser systems studies.

NASA CP-2107  
N80-13438 140 pp  
Avail NTIS 1979

**Supersonic Cruise Research 1979**

**Part 1**

NASA CP-2108  
X80-72343 538 pp  
1980

**Part 2**

NASA CP-2108  
X80-72367 408 pp  
1980

**Remote Sensing and Problems of the  
Hydrosphere**

*E. D. Goldberg*

The classification of lakes, identification and  
quantification of major functional groups of  
phytoplankton, sources and sinks of bio-  
chemical factors, and temporal and regional  
variability of surface features, atmospheric  
processes linked to hydrospheric process  
through the transfer of matter via aerosols  
and gases, particle fluxes to the aquatic envi-  
ronment, global geochemical problems.

NASA CP-2109  
N80-12718 67 pp  
Avail NTIS 1979

**Proceedings of Shuttle Environmental  
Effects Program Review**

*A. E. Potter*

Measurements of Titan exhaust cloud ef-  
fluents, mesoscale and microphysical acid rain  
models, proposed submesoscale model,  
regional air quality monitoring and rain col-  
lection systems, ecological impact of solid  
rocket motor exhaust effluents.

NASA CP-2110  
N80-15649 124 pp  
Avail NTIS 1980

**Scientific Research With the Space  
Telescope: International Astronomical  
Union Colloquium No. 54**

*M. S. Longair, J. W. Warner*

Investigations of small solar system objects,  
the physical characteristics of ionized gaseous  
nebulae, the central regions of active galaxies  
and quasars, problems of cosmology, the dis-  
tribution and composition of interstellar  
matter.

NASA CP-2111  
N80-22130 331 pp  
Avail NTIS 1979

**Preliminary Applications and Evalua-  
tion Results. Lixiscope: Proceedings of  
the Lixiscope Conference**

The principle of the lixiscope and its poten-  
tial uses in industry, clinical medicine, and  
astrophysics.

NASA CP-2112  
N80-12384 89 pp  
Avail NTIS 1978

**HEAO Science Symposium**

*C. Dailey, W. Johnson*

X-ray variability, extragalactic astronomy,  
x-ray ion line emission, optical identification  
and spectroscopy of x-ray sources, results from  
HEAO 2 imaging and nonimaging in-  
struments.

NASA CP-2113  
N80-14977 463 pp  
Avail NTIS 1979

**Validation Methods for Fault-Tolerant  
Avionics and Control Systems**

The state of the art in fault tolerant computer  
validation.

NASA CP-2114  
N80-12741 112 pp  
Avail NTIS 1979

### **Radio Interferometry: Techniques for Geodosy**

Progress in the development and application of radio interferometry as a tool for geophysical research.

NASA CP-2115

N80-28798 472 pp

Avail NTIS 1980

### **Operational Applications of Satellite Snowcover Observations**

*A. Rango, R. Peterson*

The history of remote sensing of snow cover, techniques for interpreting Landsat and NOAA satellite data, the status of future systems for continuing snow hydrology applications, the use of snow cover observations in streamflow forecasts by applications systems verification and transfer participants and selected foreign investigators, the benefits of using satellite snow cover data in runoff prediction.

NASA CP-2116

N80-25742 294 pp

Avail NTIS 1980

### **The 1979 Goddard Space Flight Center Battery Workshop**

*G. Halpert*

Results of testing, analysis, and development of the sealed nickel cadmium cell system, metal hydrogen and lithium cell technology and applications.

NASA CP-2117

N80-20820 521 pp

Avail NTIS 1980

### **Large Space Systems Technology, 1979— Antenna and Space Platform Systems Conference**

*J. C. Ward, Jr.*

Large antennas systems, large space platform systems.

NASA CP-2118

N80-19145 487 pp

Avail NTIS 1980

### **Assessment of Carbon Fiber Electrical Effects**

The risks associated with the use of carbon fiber composites in civil aircraft, the need for protection of civil aircraft equipment from fire-released carbon fibers.

NASA CP-2119

N80-19193 278 pp

Avail NTIS 1980

### **Resource Management on the Flight Deck**

*G. E. Cooper, M. D. White, J. K. Lauber*

Several approaches to the training and selection of aircrew, the psychology of the flight deck situation.

NASA CP-2120

N80-22283 247 pp

Avail NTIS 1980

### **Proceedings of the Aero-Optics Symposium on Electromagnetic Wave Propagation From Aircraft**

Wind-tunnel and flight experiments concerning natural and induced turbulence around an airplane and the effects on propagation characteristics of an emitter mounted in the airplane.

NASA CP-2121

N80-25588 666 pp

Avail NTIS 1980

### **Cryogenic Technology**

#### **Part 1**

NASA CP-2122

N80-72515 273 pp

Avail NASA GSFC 1979

#### **Part 2**

NASA CP-2122

N80-72516 159 pp

Avail NASA GSFC 1979

### **Flight Mechanics/Estimation Theory Symposium**

*A. J. Fuchs*

Methods of determining satellite orbit and attitude parameters.

NASA CP-2123

N80-28389 260 pp

Avail NTIS 1980

### **An Assessment of Ground-Based Techniques for Detecting Other Planetary Systems**

*D. C. Black, W. E. Brunk*

The feasibility and limitations of ground-based techniques for detecting other planetary systems, the level of accuracy at which these limitations would occur, the extent to which they can be overcome by new technology and instrumentation.

Volume 1. An Overview—Workshop Conclusions

NASA CP-2124

N80-18997 48 pp

Avail NTIS 1980



**An Assessment of Ground-Based Techniques for Detecting Other Planetary Systems (cont.)**

Volume 2. Position Papers

The capabilities of several astronomical interferometer system concepts, the effects of the Earth's atmosphere on astrometric precision.

NASA CP-2124

N80-25224

Avail NTIS

253 pp

1980

**Thermal Energy Storage: Fourth Annual Review Meeting**

The development of low cost thermal energy storage technologies in terms of near term oil savings, solar energy applications, and dispersed energy systems for energy conservation policies.

NASA CP-2125

N80-22788

Avail NTIS

650 pp

1980

**General Aviation Propulsion**

The quiet, clean, general aviation turbofan program; the general aviation turbine engine study program; the general aviation propeller technology program; the advanced rotary, diesel, and reciprocating engine programs.

NASA CP-2126

N80-22327

Avail NTIS

437 pp

1980

**Proceedings of the 14th Aerospace Mechanisms Symposium**

Aviation propulsion, aerodynamic devices, and crew safety; space vehicle propulsion, guidance, and control; spacecraft deployment, positioning, and pointing; spacecraft bearings, gimbals, and lubricants; large space structures.

NASA CP-2127

N80-23495

Avail NTIS

327 pp

1980

**Lightning Technology: Proceedings of a Technical Symposium**

Phenomenology, measurement, detection, protection, interaction, and testing; lightning electromagnetics, protection of ground systems, simulated lightning testing.

NASA CP-2128

N80-21927

Avail NTIS

444 pp

1980

**Validation Methods Research for Fault-Tolerant Avionics and Control Systems**

*J. W. Gault, K. S. Trivedi, J. B. Clary*

A preliminary validation methodology for fault tolerant systems; a general framework for a validation methodology.

NASA CP-2130

N80-23008

Avail NTIS

105 pp

1980

**Eighth NASTRAN User's Colloquium**

The general application of finite element methodology and the specific application of NASTRAN to a wide variety of static and dynamic structural problems.

NASA CP-2131

N80-24648

Avail NTIS

242 pp

1980

**Remote Sensing and Problems of the Hydrosphere. A Focus for Future Research**

*E. D. Goldberg*

Problems of water quality which are addressable with remote sensors; the chemical, biological, geological, and physical dynamics of natural ecosystems.

NASA CP-2132

N80-23956

Avail NTIS

55 pp

1980

**Rotordynamic Instability Problems in High-Performance Turbomachinery**

Diagnostic and remedial methods; rotor-dynamic control by feedback method, use of elastometric elements, use of hydrodynamic journal bearings and supports.

NASA CP-2133

N80-29706

Avail NTIS

463 pp

1980

**High Resolution Infrared Spectroscopy Techniques for Upper Atmospheric Measurements**

*D. G. Murcray, J. M. Alvarez*

Infrared heterodyne techniques for detecting molecules predicted to be present but not yet detected in the upper atmosphere.

NASA CP-2134

N80-27866

Avail NTIS

109 pp

1980

**Time-of-Day Corrections to Aircraft Noise Metrics**

*S. Clevenson, W. T. Shepherd*

The historical and background aspects of time-of-day corrections.

NASA CP-2135

N80-28150

Avail NTIS

81 pp

1980

### **Review of Spectroscopic Data for Measurements of Stratospheric Species**

*A. Goldman, J. Hoell*

A review of the current status of experimental and theoretical spectroscopic data on molecules of stratospheric interest, recommendations for additional research.

NASA CP-2136

N80-26125

Avail NTIS

34 pp

1980

### **Heterodyne Systems and Technology**

Active and passive systems, local oscillators, tunable diode lasers, astronomical systems.

Part 1

NASA CP-2138

N80-29652

Avail NTIS

266 pp

1980

Part 2

NASA CP-2138

N80-29672

Avail NTIS

321 pp

1980

### **Exploratory Meeting on Airborne Doppler Lidar Wind Velocity Measurements**

*G. H. Fichtel, J. W. Kaufman,  
W. W. Vaughan*

The scientific interests and applications of the airborne Doppler lidar wind velocity measurement system to severe storms and local weather, convective phenomena, local circulation, atmospheric boundary layer, atmospheric dispersion, industrial aerodynamics.

NASA CP-2140

N80-26999

Avail NTIS

57 pp

1980

### **Selected NASA Research in Composite Materials and Structures**

Failure prediction techniques, buckling and postbuckling research, laminate fatigue analysis, damage tolerance, high temperature resin matrix composites, electrical hazards of carbon fiber composites.

NASA CP-2142

N80-28436

Avail NTIS

237 pp

1980